Rajarshi Shahu Mahavidyalaya (Autonomous), Latur
Department of Computer Science
Curriculum Structure with effect from June, 2018
Syllabus (2023-24)

	Course Code	Core Course	Title of the course with paper number	Hours/ Week	Marks (50)		Credits
					Internal	End Semester	
B. Sc. II (Computer Science)Semester III	U-COS-343	CCCOS-3 Section -A	Paper-V Operating System	03	20	30	02
	U-COS-344	CCCOS-3 Section -B	Paper-VI Computer Networks	03	20	30	02
	U-COS-345	CCCOSP-3	Laboratory Course -III (Linux O. S.)	03	20	30	01
	U-COS-346	CCCOSP-4	Laboratory Course -IV (Computer Networks)	03	20	30	01
		SECCOS-1	Office Automation Tools	03	25	25	2
			Total Credits				**06+02**

Student Stay Hours: 15/Week

	Course Code	Core Course	Title of the course with paper number	Hours/ Week	Marks (50)		Credits
					Internal	End Semester	
B. Sc. II (Computer Science) Semester IV	U-COS-443	CCCOS-4 Section -A	Paper-VII Digital Electronics and Microprocessor 8086	03	20	30	02
	U-COS-444	CCCOS-4 Section -B	Paper-VIII Java Programming	03	20	30	02
	U-COS-445	CCCOSP-5	Laboratory Course-V (DE and Microprocessor)	03	20	30	01
	U-COS-446	CCCOSP-6	Laboratory Course-VI (Java Programming)	03	20	30	01
		SECCOS-2	HTML 5	03	25	25	2
			Total Credits				**06+02**

Student Stay Hours: 15/Week

B. Sc. – II [Computer Science] Semester III
Course: Operating System
Course Code: U-COS-343
CCCOS-3
Paper-V Section –A

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To know the components and management aspects of concurrency management
- To learn programmatically to implement simple OS mechanisms

Course Outcomes:
After successful completion of this course students should be able to:
- Analyze the structure of OS and basic architectural components involved in OS design
- Analyze the mechanisms of OS to handle processes and threads and their communication
- Understand the Mutual exclusion, Deadlock detection.
- Conceptualize the components involved in designing OS.

Unit-I Introduction and Operating System Organization   [13 hrs.]
Introduction: System Software, Resource Abstraction, OS strategies.
Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems.
Operating System Organization: Factors in operating system design, basic OS functions, implementation consideration, process modes, and methods of requesting system services – system calls and system programs.

Unit II Process Management   [12 hrs.]
System view of the process and resources, initiating the OS, process address space, critical section, process abstraction, resource abstraction, process hierarchy, Thread model Scheduling: Scheduling Mechanisms,   Strategy selection, non-preemptive and preemptive strategies, Deadlock**.**

Unit III Memory Management   [10 hrs.]

Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, Paging, virtual memory, Demand Paged, Segment Memory Management

Unit IV Device and Information Management System   [10 hrs.]

Techniques for Device management, Device management characteristics, Channels and control units Device allocation consideration
A simple file system, General model of a file system, Symbolic File System, Basic File System.

Books Recommended:

1. Operating Systems Concepts by A. Silberschatz, P.B. Galvin, G. Gagne, 8th Edition, John Wiley Publications 2008.

2. Modern Operating Systems by A. S. Tanenbaum, 3rd Edition, Pearson Education 2007.

3. Operating Systems: A Modern Perspective by G. Nutt, 2nd Edition Pearson Education 1997.

4. Operating Systems, Internals & Design Principles by W. Stallings, 5th Edition, Prentice Hall of India. 2008.

5. Operating Systems- Concepts and design by M. Milenkovic, Tata McGraw Hill 1992.

B. Sc. – II [Computer Science] Semester III
Course: Laboratory Course III
(Linux O.S.)
CCCOSP-3

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
Skills and knowledge students will gain in this course:
- Install Red Hat based Linux distributions;
- Maintain operating system updates;
- Understanding of each of the following:
- Basics of Linux security;
- Major issues involved in Open-Source licensing;
- Basics of Linux scripting and be able to write a simple script;

Course Outcomes:
After successful completion of this course students should be able to:
- Use basic Linux commands from the command line (from a terminal window).
- Organize and manage their files within the Linux file system;
- Knowledgeable enough about basic Linux shell scripting
- Read, Write and edit shell scripts.

Practical List:
1. Usage of following commands: ls, pwd, tty, cat, who, whoami, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat (append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users.
10. Write a shell script to display the multiplication table any number,

11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
14. Write a shell script to find the LCD (least common divisor) of two numbers.
15. Write a shell script to find the factorial of a given number.

B. Sc. – II [Computer Science] Semester III
Course: Computer Network
Course Code: U-COS-344
Paper- VI

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic categorization and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Course Outcomes:
After successful completion of this course students should be able to:
- Understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of sub netting and routing mechanisms.

UNIT I: Introduction of Computer Networks   [12 hrs.]
Computer Networks and Uses of Computer Networks
Network Hardware and types
Network Software
Connection Oriented Vs Connectionless Services
Reference Models
OSI Reference Model
The TCP/IP Reference Model
Examples of Networks
The internet ARPANET NSFNET
Architecture of the Internet
Third Generation and Fourth Generation Mobile Phone Networks
Wireless LANs: 802.11
RFID and Sensor Networks

UNIT II: The Physical Layer   [13 hrs.]
The Basis for Data Communication
Transmission Media Magnetic Media Twisted Pairs
Coaxial Cable Power Lines Fiber Optics Fiber Cables
Wireless Transmission Communication Satellites
Digital Modulation and Multiplexing

UNIT III: The Data Link Layer and Network Layer   [10 hrs.]

Data Link Layer Design Issues Error Control and Flow Control Error Detection
and Correction Sliding window Protocols
A Protocol Using Go-Back-N
A Protocol Using Selective Repeat Network Layer Design Issues
Implementation of Connection Oriented Routing Algorithms Naming and
Internet Addressing
IP Addresses and IPV6

UNIT IV: Transport and Application Layers   [10 hrs]

Transport Service
Elements of Transport Protocols
Addressing, Connection
Establishment, Connection Release
Error Control and Flow Control
Multiplexing Congestion Control
The Domain Name System Electronic Mail
FTP, HTTP, SMTP

References/Books:

1. Computer Networks (Andrew S Tanenbaum)
2. Data and Computer Communications (William Stallings)

B. Sc. – II [Computer Science] Semester III
Course: Lab-Course IV
(Computer Networks)

Teaching Hours: 45   **Marks : 50**

Learning Objectives:
- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic categorization and terminology of the computer networking area.
- Understanding the procedure to create and manage LANs.

Course Outcomes:
After successful completion of this course students should be able to:
- Independently understand basic computer network technology.
- Create and Manage Local Area Networks
- Identify the different types of network topologies and protocols.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of sub netting and routing mechanisms.

Practical List
1. Study of different types of Network cables.
2. Practically implement the cross-wired cable and straight through cable using clamping tool.
3. Study of Network Devices in Detail.
4. Test TCP/IP Setup and create user accounts and user group.
5. Study of network IP.
6. Connect the computers in Local Area Network.
7. Study of basic network command and Network configuration commands.
8. Configure a Network topology using packet tracer software.
9. Configure a Network using Distance Vector Routing protocol.

Skill Enhancement Course
B. Sc. – II [Computer Science] Semester III
Course: Office Automation Tools
Course Code: SECCOS-I

Teaching Hours: 40   **Marks: 50**

Learning Objectives:
- To learn the word processing and formatting.
- to learn spreadsheets, adding graphs and charts.
- To learn use of formulas and function.
- To learn presentation slides and animations.

Course Outcomes:
After successful completion of this course students should be able to:
- to perform documentation and use mail merge tool
- to perform accounting operations, Creating Graphs
- to perform presentations with animation.

Introduction to open office/MS office

Word Processing:
Formatting Text: Changing fonts, size, bullet and numbering, other formatting, cut, copy, paste, find and replace, Page Layout, Tables, Pages, Mail merge.

Spreadsheets:
Working with Worksheets, formatting data, creating charts and graphs, using formulas and functions, Macros, Pivot Table

Presentation Tools:
 Adding and formatting text, pictures, graphic objects, including charts, objects formatting slides, notes, hand-outs, slide shows, using transitions, animations

Books Recommended:
1. Sushila Madan , Introduction to Essential tools, JBA,2009.
2. Anita Goel, Computer Fundamentals, Pearson, 2012

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To develop programming ability in the Java programming language.
- Knowledge of object-oriented paradigm of language.
- The use of Java in a variety of technologies and on different platforms.

Course Outcomes:
After successful completion of this course students should be able to:
- Ability to understand the structure and model of the Java programming language.
- Students will be able to use the Java programming language for various programming technologies.
- Ability to develop software, application in the Java programming language.

UNIT- I: An Introduction to Java   [10 Hrs]
Introduction to Object Oriented Programming, Basic concepts of OOPs, A Short History of Java, Features of Java, Difference between Java and C++, Java virtual machine (JVM), Java program structure, Java statement, Types of Comments, Keywords, Data Types, Variables and Constants, Operators, Output using println () method, Simple Java Program, Command Line Arguments.

Unit – II: Decision Making, Branching, Looping and Classes, Object and Methods   [13 Hrs]
Decision making statement, Simple if statement, if...else statement, Nesting of if...else, Switch statement, while statement, do statement, for statement.
Introduction, defining a class, adding variables, Adding Methods, Accessing Class Members, Constructors, Method Overloading, Static Members, Inheritance: Extending a class, Overriding Method

Unit –III: Arrays, Strings, Vectors and Creating and Using Packages
[10 Hrs]

Introduction, One-dimensional Arrays: Creating one dimensional array,
Two- dimensional Arrays: Creating two-dimensional array, String Arrays, String Method
Introduction, Java API package, using system packages, Naming Conventions, Creating Packages, accessing a package, using a Package, Adding a class to a package

Unit – IV: Exception Handling and Applet Programming   [10 Hrs]

Dealing Errors, catching exception and exception handling, create user defined exception. Applet Life Cycle, Applet HTML Tags, passing parameters to Applet, repaint () and update () method

Reference Books:

1. Programming with Java, A primer, Fourth edition, By E. Balagurusamy
2. Complete reference Java by Herbert Schildt (5th edition)
3. Java 2 programming black books, Steven Horlzner
4. Java Servlets Programming by Jason Hunter, O'Reilly

Teaching Hours: 45   **Marks: 50**

Learning Objectives:

- To develop programming ability in the Java programming language.
- Knowledge of object-oriented paradigm in the Java programming language.
- The use of Java in a variety of technologies and on different platforms.

Course Outcomes:
After successful completion of this course students should be able to:
- Ability to understand the structure and model of the Java programming language.
- Students will be able to use the Java programming language for various programming technologies.
- Ability to develop software, application in the Java programming language.

Proposed Practical List:

1. Simple java program.

2. Program to demonstrate command line argument.

3. Program to demonstrate control statements.

4. Program to demonstrate Looping statements

5. Program to demonstrate constructors.

6. Program to demonstrate method overloading

7. Program to demonstrate static members.

8. Program to demonstrate method overriding

9. Program to demonstrate inheritance.

10. Program to demonstrate one dimensional array.

11. Program to demonstrate two dimensional array.

12. Program to demonstrate String methods.

13. Program to demonstrate package.

14. Program to demonstrate Exception handling.

15. Program to demonstrate applet.

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- To prepare students to perform the analysis and design of various digital electronic circuits.
- To develop understanding of internal architecture of Computer.
- To aware students about basics of microprocessor and assembly language programming.

Course Outcomes:
After successful completion of this course students should be able to:
- To have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
- To understand and examine the structure of various number systems and its application in digital design.
- The ability to understand, analyze and design various combinational and sequential circuits.
- Students are able to do the assembly language programming of microprocessor 8086

UNIT – I Boolean Algebra And Gate Network   [15 hrs]

Introduction with definitions of Logic, gate, Truth table, Boolean Equation, Logic symbol. Digital Signals Basic Gates and Derived Gates: AND, OR, NOT, NAND, NOR, Ex-OR, Ex- NOR
Basic laws and rules of Boolean algebra, De-Morgan's theorem I & II , Universal property of NAND gate & NOR gate, Formats of logical equation SOP,POS, K-map examples for SOP and POS format

UNIT – II Logic Circuit   [10 hrs]

Combinational Logic Circuit : Adder and Substractor -half Adder, full adder, half substractor, full substractor, Multiplexer and De-multiplexer with its application, Difference between mux and De-mux , Encoder and decoder with types.

Sequential Logic Circuit : Basics of Clock signal, Triggering methods Flip-Flop with types SR flip-flop, D flip-flop, T flip-flop, JK flip flop , Shift Register with its types (SISO,SIPO,PISO,PIPO) Counter with types Asynchronous, Synchronous, Up, Down , Difference between synchronous and

Asynchronous counter

UNIT – III Control Unit And Memory   [10 Hrs]

General model of control unit, Hardwired control unit, Micro-programmed control unit

Memory Characteristics, Memory Hierarchies, Classification of memory, Primary and Secondary memories, Virtual and Cache memory, High speed Memories: Interleaved and Associative memory

Unit – IV Introduction To Microprocessor 8086   [10 Hrs]

General Block Diagram of Microprocessor, History of microprocessor
Features of Intel 8086, Architecture of Intel 8086, Functional Pin
Diagram of Intel 8086 Pin description, Buses, Format of instruction,
Addressing Modes of Intel 8086 Instruction set of Intel 8086,
Assembly Language Programming of 8086

Reference Books
1. Digital Computer Fundamentals by Floyd, Thomas L, 3rd Edition 1997.
2. Modern digital electronics by R. P. Jain
3. Computer Architecture and Organization J.P. Hayes (MGH)
4. Microprocessor 8086 by B. Ram

B. Sc. – II [Computer Science] Semester IV
Course: Lab-Course VI
(Digital Electronics and Microprocessor)

Teaching Hours: 45   **Marks: 50**

Learning Objectives:
- To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
- To prepare students to perform the analysis and design of various digital electronic circuits.
- To impart to you the concepts of sequential circuits enabling you to analyze sequential systems in terms of state machines.
- It will cover machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic.
- The emphasis is on studying and analyzing fundamental issues in architecture design and their impact on performance.

Course Outcomes:
After successful completion of this course students should be able to:
- To have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
- To understand and examine the structure of various number systems and its application in digital design.
- The ability to understand, analyze and design various combinational and sequential circuits.
- To understand the basics of computer hardware and how software interacts with computer hardware
- To analyze and evaluate computer performance
- Students are able to do the assembly language programming of microprocessor 8086

Proposed Practical List

1. To perform and verify the truth tables of All Logic Gate.

2. To perform and verify LHS and RHS of Demorgan's Theorem I & II.

3. To perform and verify various laws.

4. To perform universal property of NAND gate.

5. To perform universal property of NOR gate.

6. To Implement and verify the truth table of any One Boolean equation.

7. To perform and verify the truth table of Half adder.
8. To perform and verify the truth table of Half Substractor.
9. To perform and verify the truth table of Multiplexer.
10. To perform and verify the truth table of De-multiplexer.
11. To perform and verify the truth table of Encoder
12. To perform and verify the truth table of Decoder
13. Write an ALP for checking various operations.
14. Write an ALP for addition and substraction.
15. Write an ALP for multiplication and division

Teaching Hours: 40   **Marks: 50**

Learning Objectives:
- To acquire the basic knowledge of HTML and web pages
- To learn concept of browser and WWW.
- To work with images, hyperlinks, tables in HTML

Course Outcomes:
After successful completion of this course students should be able to:
- Create own web pages using HTML5
- Format created webpages and work with images and tables.
- Create interactive websites.

1. Introduction To Web Publishing

Browser, Web Server, Overview of HTML, Rules
and Guidelines Structure Of HTML, Web
Browser, WWW, URL Concept, Basic Tags.

2. HTML Formatting

Comment Tag, Paragraph Tag, Address Tag, List Tag, Break Tag, Heading Tag
<HR> Tag , <Pre> formatted Tag , DIV Tag, Font Tag
, Marquee Tag Formatted and unformatted tag ,
Special Character.

3. Working With Images in HTML

Image Tag & Attributes
External Image, Image Map, Inline Image

4. Using Hyperlink in HTML

Hyperlink & its Attribute
Mail to Anchor, HTML –Image Links

5. Using Table in HTML

Creating Tables Editing Tables Formatting Tables Deleting Tables

6. Basics of Interactivity

Overview of Frame
<Frameset>, Frame Targeting
Floating Frames, Form Basics

Book Recommended:

1. Introduction to **HTML** and CSS -- O'Reilly, 2010
2. Jon Duckett, HTML and CSS, John Wiely, 2012
3. HTML5 Black Book by Kogent learning solutions.
   Online References:
   W3schools.com