

# **Shri Rawatpura Sarkar University, Raipur**



## **Examination Scheme & Syllabus**

### **For**

## **Bachelor of Computer Application**

### **Semester-II**

(Effective from the session: 2022-23)

**Department of Computer Science & Engineering**



**SHRI RAWATPURA SANKAR UNIVERSITY, RAIPUR, CHHATTISGARH**  
**FACULTY OF ENGINEERING**  
**B.C.A. Second Semester**

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

**Faculty of Science**  
**Bachelor of Computer Application**  
**Semester-II**  
**Teaching & Examination Scheme**  
**(Effective from the session: 2022-23)**

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	SCA04211	Environment Science	3	1	-	4	30	70	100	3 Hrs
2	SCA04201	Object Oriented Programming using C++	3	1	-	4	30	70	100	3 Hrs
3	SCA04202	Operating System	3	1	-	4	30	70	100	3 Hrs
4	SCA04203	System Analysis & Design	3	1	-	4	30	70	100	3 Hrs
5	SCA04204	Introduction to UNIX and Shell Scripting	3	1	-	4	30	70	100	3 Hrs
6	SCA04291	Object Oriented Programming using C++ Lab	-	-	4	2	15	35	50	3 Hrs
7	SCA04292	Unix & Shell Programming Lab	-	-	4	2	15	35	50	3 Hrs
<b>Total Contact Hrs per week: 28</b>			<b>Total Credit:24</b>				<b>Total Marks: 600</b>			



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<b>Course Title</b>	<b>Environment Science</b>				
<b>Course Code</b>	<b>SCA04-211</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	
<b>Prerequisites</b>	Basic knowledge about the Environment.				
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>● Create awareness about environmental problems among learners.</li><li>● Impart basic knowledge about the environment and its allied problems.</li><li>● Develop an attitude of concern for the environment.</li><li>● Motivate learners to participate in environment protection and environment improvement.</li><li>● Acquire skills to help the concerned individuals in identifying and solving environmental problems.</li><li>● Strive to attain harmony with nature.</li></ul>				
<b>Course Contents</b>	<p><b>UNIT – I : General</b></p> <p><b>General:</b> Environmental segments, environmental degradation, environmental impact assessment. Concept of Ecosystem: Fundamental of Ecology and Ecosystem, components of ecosystem, food-chain, food- web, trophic levels, and energy flow, cycling of nutrients, major ecosystem types (forest, grass land and aquatic ecosystem).</p> <p><b>UNIT – II : Air Pollution</b></p> <p><b>Air Pollution:</b> Atmospheric composition, energy balance, classification of air pollutants, source and effect of pollutants – Primary (CO, SO<sub>x</sub>, NO<sub>x</sub>, particulates, hydrocarbons), Secondary [photochemical smog, acid rain, ozone, PAN (PeroxyAcetyl Nitrate)], greenhouse effect, ozone depletion, atmospheric stability and temperature inversion, Techniques used to control gaseous and particulate pollution, ambient air quality standards.</p>				



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	<p><b>UNIT – III : Water Pollution</b></p> <p><b>Water Pollution:</b> Hydrosphere, natural water, classification of water pollutants, trace element contamination of water, sources and effect of water pollution, types of pollutants, determination and significance of D.O., B.O.D., C.O.D. in wastewater, Eutrophication, methods and equipment used in wastewater treatment preliminary, secondary and tertiary.</p> <p><b>UNIT – IV : Land Pollution Noise Pollution</b></p> <p><b>Land Pollution Noise Pollution:</b> Lithosphere, pollutants (agricultural, industrial, urban waste, hazardous waste), their origin and effect, collection of solid waste, solid waste management, recycling and reuse of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting). Noise Pollution: Sources, effect, standards and control.</p> <p><b>UNIT – V : Environmental Biotechnology</b></p> <p><b>Environmental Biotechnology:</b> Definition, current status of biotechnology in environmental protection, bio-fuels, bio-fertilize, bio-surfactants, bio-sensor, bio-chips, bio-reactors. Pollution Prevention through Biotechnology: Tannery industry, paper and pulp industry, pesticide industry, food and allied industry.</p>
<b>Course Outcomes</b>	This course student will be able to establish a new correlation among scientific rules, natural principles and its applications for set a path to study the environment.
<b>Text Books</b>	<ol style="list-style-type: none"><li>1. Environment and Ecology by PiyushKant Pandey and Dipti Gupta (Sum India Publication).</li><li>2. A Textbook of Environmental Chemistry and Pollution Control by S.S. Dara (S. Chand and Company).</li></ol>
<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Masters, G.M. Introduction to Environment Engineering and Science (Prentice Hall of India).</li><li>2. Environmental Chemistry by A.K. Dey (EasternLtd.).</li><li>3. Environmental Chemistry by B.K. Sharma (KrishnaPrakashan).</li></ol>

## B.C.A. Second Semester

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<b>Course Title</b>	<b>Object Oriented Programming using C++</b>				
<b>Course Code</b>	<b>SCA04-201</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	
<b>Prerequisites</b>	Basic knowledge about Computer and C Language.				
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>● Understand object-oriented programming features in C++,</li><li>● Apply these features to program design and implementation,</li><li>● Understand object-oriented concepts and how they are supported by C++,</li><li>● Understand implementation issues related to object-oriented techniques,</li><li>● Build good quality software using object-oriented programming technique</li></ul>				
<b>Course Contents</b>	<p><b>UNIT – I : Overview of C++</b></p> <p><b>Overview of C++</b> Overview of C++, Software crisis, Object-Oriented Programming paradigm, Basic concepts of OOP, Advantages / Benefits of OOP, Usage/applications of OOP.<b>C++ Environment</b> - Program development environment, The language and the C++ language standards, Introduction to various C++ compilers, The C++ standard library, Prototype of main () function, i/o operator, manipulator, comments, data types.<b>Creating and Compiling C++ Programs:</b> - TURBO C++ IDE, Creating, compiling and running a C++ program using idea and through command line, Elements of C++ Language, Structure of a C++ program, C++ tokens, Type conversion in expressions, Decision Making and Branching.</p> <p><b>UNIT – II : Arrays and Functions</b></p> <p><b>Arrays and Functions-</b> Arrays, The meaning of an array, Single-dimensional arrays, Two dimensional arrays (Multi-dimensional arrays), User Defined Functions, Elements of user defined functions, Return values and their types, Function calls, Categories of functions, Passing parameters to functions, Recursion, Command Line Arguments, Storage Class Specifies.<b>Classes and Objects</b> - Classes, Structures and classes, Unions and classes, Friend function, Friend classes, Inline function, Scope</p>				



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	<p>resolution operator, Static class members, Static data members, Static member functions, Passing object to functions, Returning objects, Object assignment.</p> <p><b>UNIT – III : Constructors and Destructors</b></p> <p><b>Constructors and Destructors</b> - Introduction, Constructors, Default Constructor, Parameterized constructors, Copy Constructors, Multiple Constructors in a class, Constructors with default arguments, Default Arguments, Special Characteristics of Constructor functions, Destructors.</p> <p><b>UNIT – IV : Function and Operator Overloading</b></p> <p><b>Function and Operator Overloading:</b> - Function overloading, Overloading Constructor Function, Finding the address of an overloaded function, Operator Overloading. <b>Inheritance</b> - Introduction to inheritance, Features or Advantages of Inheritance, Type of Inheritance, Base Classes and Derived Classes, Base Class Access Control</p> <p><b>UNIT – V: Polymorphism</b></p> <p><b>Polymorphism</b> - Polymorphism, Types of Polymorphism, Virtual Functions and Polymorphism, Pure Virtual Functions, Early Vs Late Binding. <b>The C++ I/O System Basics</b> - The C++ I/O System basics, C++ predefined streams, Formatting using the is members, Clearing Format Flags.</p>
<b>Course Outcomes</b>	<p>1. Knowledge and Understanding- At the end of a course the student will understand the concepts of:</p> <ol style="list-style-type: none"> <li>a) Variables, data Types (including strings and arrays) and Expressions</li> <li>b) Flow of Control</li> <li>c) Functional and procedural abstraction and its importance in good program design</li> <li>d) Pointers and memory allocation (static and dynamic)</li> <li>e) Iteration and Recursion</li> </ol>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Object Oriented Programming: Mc Gregor and Sykes SA, 1992 Van Nostrand.</li> <li>2. The C++ Programming Language: Strustrup B, Addison Wesley</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Object Oriented Programming in C++: Lofor, Galgotia Publications.</li> <li>2. The C Programming Language Book by Brian Kernighan and Dennis Ritchie.</li> </ol>



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<b>Course Title</b>	<b>Operating System</b>				
<b>Course Code</b>	<b>SCA04-202</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	
<b>Prerequisites</b>	Basic knowledge about Computer and C Language.				
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>• Students should be able to understand the basic knowledge of Operating system (DOS, Windows, NT, &amp; Linux).</li> <li>• To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization.</li> </ul>				
<b>Course Contents</b>	<p><b>UNIT- I INTRODUCTION:</b> Operation System objective and function, The Evolution of operating Systems, Batch, interactive, time sharing and real time systems, Protection. Operating System Structure, System Components, operating system service, System structure.</p> <p><b>UNIT-II CONCURRENT PROCESSES:</b> Process concept: Introduction, Definitions of “Process”, Process States, Process State Transitions, The process Control Block, Operations on Processes, Suspend and Resume, Interrupt Processing. Mutual Exclusion, the Producer / Consumer problem, the critical section problem, Semaphores, Classical problems in concurrency, inter process communication.</p> <p><b>UNIT- III DEAD LOCKS:</b> System model, Deadlock characterization. Prevention, Avoidance and Detection, Recovery from deadlock, combined approach.</p> <p><b>UNIT-IV MEMORY MANAGEMENT:</b> Base machine, resident Monitor,</p>				



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	<p>multiprogramming with fixed partition, Multiprogramming with variable partitions, Paging, Segmentation, paged - segmentation, virtual Memory concepts.</p> <p><b>UNIT-V I/O MANAGEMENT &amp; DISK SCHEDULING:</b> I/O device and the organization of the I/O function, I/O Buffering, Disk I/O, Operating system Design issues. File system: File Concepts – File organization and Access mechanism, File Directories, File sharing, Implementation issues. Case studies: UNIX system.</p>
<b>Course Outcomes</b>	<ul style="list-style-type: none"><li>● After completion of this course the students will be able to apply their basic knowledge of OS &amp; its application.</li><li>● Students will be able to apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization.</li></ul>
<b>Text Books</b>	<ol style="list-style-type: none"><li>1. DosQuickReferenceByRajeevMathur,GalgotiaPublicationsLinuxCompleteBy BpbPublications</li><li>2. Peter Norton Complete Guide To Linux By Peter Norton, Tech media Publications</li></ol>
<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Information Technology by Khanna Book Publications, New Delhi.</li><li>2. Windows XP Complete Reference, Bpb Publication.</li></ol>





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<b>Course Title</b>	<b>System Analysis &amp; Design</b>				
<b>Course Code</b>	<b>SCA04-203</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	
<b>Prerequisites</b>	Basic knowledge about algorithms and System.				
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>● To provide knowledge of various methods for Systems analysis that requires for software development.</li> <li>● Equip the students with mathematical preliminaries required to analyze and design computer algorithms.</li> <li>● Introducing students to the general tools and techniques for analyzing computer algorithms.</li> <li>● This course aims to introduce the classic algorithms in various domains, and techniques for designing efficient algorithms.</li> </ul>				
<b>Course Contents</b>	<p><b>UNIT – I: Introduction to System</b></p> <p><b>Introduction to System:</b> Introduction: Definition of a System, Types of Systems, Delineating Systems, Products, and Tools, Precedent versus Unprecedented Systems: Analytical Representation of a System: Systems that require engineering:</p> <p><b>UNIT – II: Data and Information</b></p> <p><b>Data and Information:</b> Types of information, operational, tactical, strategic and statutory, why do we need information systems, management structure, requirements of information at different levels of management, functional allocation of management.</p> <p><b>UNIT – III: System Attributes, Properties, and Characteristics</b></p>				



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	<p><b>System Attributes, Properties, and Characteristics:</b> Introduction, Overview of Attributes, Properties, Characteristics and elements of system, Every System has its own unique identity, Understanding System Performance, System Characteristics, The System's State of Equilibrium.</p> <p><b>UNIT – IV: The Architecture of Systems</b></p> <p><b>The Architecture of Systems:</b> Introducing the System Architecture Construct: Introduction of the System Elements, Understanding System Element Entity Relationships: Guiding Principles.</p> <p><b>UNIT – V: The Systems Development Life Cycle</b></p> <p><b>The Systems Development Life Cycle:</b> - Feasibility, Analysis Planning and Design, Implementation, Testing, Maintenance. Requirements determination, requirements specifications, Feasibility analysis, final specifications, hardware and software study, Role of systems analyst.</p>
<p style="text-align: center;"><b>Course Outcomes</b></p>	<ul style="list-style-type: none"><li>● After completion of this course:<ul style="list-style-type: none"><li>○ The students will be knowledge of life cycle of architecture of systems and understanding of system concepts and role of systems development.</li><li>○ Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various</li><li>○ Analyze the complexities of various problems in different</li><li>○ Apply the algorithms and design techniques to solve problems.</li></ul></li></ul>
<p style="text-align: center;"><b>Text Books</b></p>	<ol style="list-style-type: none"><li>1. System analysis &amp; design by Kamal Prakashan.</li><li>2. System analysis &amp; design by Goyal A.</li></ol>
<p style="text-align: center;"><b>Reference Books</b></p>	<ol style="list-style-type: none"><li>1. System analysis &amp; design by Dennis and Wixom.</li><li>2. System analysis &amp; design by Elias M Award.</li></ol>



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<b>Course Title</b>	<b>Introduction to UNIX and Shell Scripting</b>				
<b>Course Code</b>	<b>SCA04-204</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	
<b>Prerequisites</b>	Basic knowledge about Operating System				
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>● The overall objective with the course is to understand basic working principles of computer OS and give knowledge insights into the Unix &amp; shell programming.</li><li>● To learn the fundamentals of shell scripting/programming</li><li>● To familiarize students with the Unix environment.</li><li>● To familiarize students with basic Unix shell script programming.</li></ul>				
<b>Course Contents</b>	<p><b>UNIT – I : Introduction to Unix</b></p> <p><b>Introduction to Unix:</b> Architecture of Unix, Features of Unix , Unix Commands – PATH, man, echo, printf, script, password, username, who, date, stty, pwd, cd, mk-dir, rm-dir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip. Unix utilities: Introduction to Unix files system, vi editor.</p> <p><b>UNIT – II : Introduction to shells</b></p> <p><b>Introduction to shells:</b> - Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, -Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell / Environment Customization.</p> <p><b>UNIT – III : Group</b></p>				



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	<p><b>Group:</b> - Operation, Group Family, Searching for File Content. SED: Scripts, Operation, Addresses, commands, Applications, Group and sed. AWK: Execution, Fields and Records.</p> <p><b>UNIT – IV: Interactive korn shell:</b></p> <p><b>Interactive korn shell:</b> - Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, equal Command, Environmental Variables, Options.</p> <p><b>UNIT – V: Interactive c shell</b></p> <p><b>Interactive c shell:</b> - C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, Environmental Variables, On-Off Variables, Start-up and Shutdown Scripts, Command History, Command Execution, Scripts. C shell programming: Classification of parallel architectures, Vector Processing, Array Processors.</p>
<p style="text-align: center;"><b>Course Outcomes</b></p>	<ul style="list-style-type: none"><li>● After completion of this course:<ul style="list-style-type: none"><li>○ The students will be able to apply for basic knowledge about UNIX system.</li><li>○ To learn the fundamentals of shell scripting/programming</li><li>○ To familiarize students with the Unix environment.</li><li>○ To familiarize students with basic Unix shell script programming.</li></ul></li></ul>
<p style="text-align: center;"><b>Text Books</b></p>	<ol style="list-style-type: none"><li>1. UNIX and shell Programming, Behrouz A. Forouzan, Richard F, Gilberg, Thomson.</li><li>2. Your UNIX the ultimate guide, Sumitabha Das, TMH. 2nd Edition. References.</li></ol>
<p style="text-align: center;"><b>Reference Books</b></p>	<ol style="list-style-type: none"><li>1. UNIX for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson education.</li><li>2. UNIX programming environment, Kernighan and Pike, PHI, Pearson Education.</li><li>3. The Complete Reference UNIX, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.</li></ol>



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<b>Course Title</b>	<b>Object Oriented Programming using C++ Lab</b>				
<b>Course Code</b>	<b>SCA04-291</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	-	-	4	2	
<b>Prerequisites</b>	Basic knowledge about C Language.				
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>● Student should be able to understand the basic knowledge of Object-Oriented Programming.</li><li>● Understand object-oriented programming features in C++,</li><li>● Apply these features to program design and implementation,</li><li>● Understand implementation issues related to object-oriented techniques,</li><li>● Build good quality software using object-oriented programming technique.</li></ul>				
<b>Course Contents</b>	<b>List of Practical</b> <ol style="list-style-type: none"><li>1. C++ "Hello, World!" Program</li><li>2. C++ Program to Print Number Entered by User</li><li>3. C++ Program to Add Two Numbers</li><li>4. C++ Program to Find Quotient and Remainder</li><li>5. C++ Program to Find Size of int, float, double and char in Your System</li><li>6. C++ Program to Swap Two Numbers</li><li>7. C++ Program to Check Whether Number is Even or Odd</li><li>8. C++ Program to Check Whether a character is Vowel or Consonant.</li><li>9. C++ Program to Find Largest Number Among Three Numbers</li><li>10. C++ Program to Find All Roots of a Quadratic Equation</li></ol>				



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<b>Course Outcomes</b>	<ul style="list-style-type: none"><li>● After completion of this course the students will be able to apply their knowledge about Object-Oriented Programming.</li><li>● Knowledge and Understanding- At the end of a course the student will understand the concepts of:<ul style="list-style-type: none"><li>a) Variables, data Types (including strings and arrays) and Expressions</li><li>b) Flow of Control</li><li>c) Functional and procedural abstraction and its importance in good program design</li><li>d) Pointers and memory allocation (static and dynamic)</li><li>e) Iteration and Recursion</li></ul></li><li>● Skills - At the end of the course, a student will be able to: Analyse a simple programming problem specification &amp; design a high-level (programming language independent) solution to the problem using functional abstraction and general imperative programming language constructs.</li></ul>
<b>Suggested Software</b>	<ol style="list-style-type: none"><li>1. Turbo C++</li><li>2. Dev C++</li></ol>
<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Balagurusamy, Programming with C++, TMH.</li><li>2. Programming with C++ :Bhave&amp;. Patekar, Pearson Education.</li><li>3. Introduction on C++: Horstman, Willey India, 2nd Edition.</li></ol>



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<b>Course Title</b>	<b>Unix &amp; Shell Programming Lab</b>				
<b>Course Code</b>	<b>SCA04-292</b>				
<b>Semester</b>	<b>BCA</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>TC</b>	
	-	-	4	2	
<b>Prerequisites</b>	Basic knowledge about Operating System.				
<b>Course Objectives</b>	<ul style="list-style-type: none"><li>● The overall objective with the course is to understand basic Unix shell programming.</li><li>● To learn the fundamentals of shell scripting/programming</li><li>● To familiarize students with the Unix environment.</li><li>● To familiarize students with basic Unix shell script programming.</li></ul>				
<b>Course Contents</b>	<p><b>List of Practical</b></p> <ol style="list-style-type: none"><li>1. List out the following commands: - mkdir, ls – l, ls – latira, cp, mv, cd, rm, etc.</li><li>2. Display lines 10 to 14 of science.txt. % to create on PICO Tools.</li><li>3. Practices on vi &amp; pico and gv editor and create different types of files.</li><li>4. Practices on access control system on mechanism (chmod).</li><li>5. Your C program should read a number from the user and displays two prime numbers whose sum is that number. % ./about Number?</li><li>6. Write in a C program in sum of two primes. For example, the number 18 is the sum of 7 and 11, both prime.</li><li>7. Write a program in c language and run on K shell.</li><li>8. List out the following system commands: pmstat, vmstat, iostat, top, sar, ect.</li><li>9. What are the various editors in UNIX and Linux OS &amp; practice.</li><li>10. Install the Linux and unbantu on desk top.</li></ol>				





**SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH**  
**FACULTY OF ENGINEERING**  
**B.C.A. Second Semester**

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

<b>Course Outcomes</b>	<ul style="list-style-type: none"><li>● After completion of this course:<ul style="list-style-type: none"><li>○ The students will be able to apply for basic knowledge about UNIX system.</li><li>○ The students will be able to learn the fundamentals of shell scripting/programming</li><li>○ The students will be able to familiarize students with the Unix environment.</li><li>○ The students will be able to familiarize students with basic Unix shell script programming.</li></ul></li></ul>
<b>Suggested Software</b>	Ubuntu
<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. UNIX and shell Programming, Behrouz A. Forouzan, Richard F, Gilberg, Thomson.</li><li>2. Your UNIX the ultimate guide, Sumitabha Das, TMH. 2nd Edition. References.</li><li>3. UNIX for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson education.</li><li>4. UNIX programming environment, Kernighan and Pike, PHI, Pearson Education.</li><li>5. The Complete Reference UNIX, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.</li><li>6. Unix Shell programming, Yashwanth Kanitkar, 1stEdition, BPB Publisher.</li></ol>