

**Shri Rawatpura Sarkar University,
Raipur**



**Examination Scheme & Syllabus
For
Bachelor of Computer Application
Semester-IV**

(Effective from the session: 2022-23)



Shri Rawatpura Sarkar University, Raipur

Three Years B.C.A. Programme

Scheme of Teaching and Examination

B.C.A. Fourth Semester

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

(Effective from the Academic Year 2022-2023)

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	SCA04401	Java Programming	3	1	-	4	30	70	100	3 Hrs
2	SCA04402	Computer Architecture	3	1	-	4	30	70	100	3 Hrs
3	SCA04403	Computer Networks	3	1	-	4	30	70	100	3 Hrs
4	SCA04404	Software Engineering	3	1	-	4	30	70	100	3 Hrs
5	SCA04451	Elective –I	3	1	-	4	30	70	100	3 Hrs
6	SCA04492	Java Programming Lab	-	-	4	2	15	35	50	3 Hrs
7	SCA04493	Elective –I Lab	-	-	4	2	15	35	50	3 Hrs
Total Contact Hrs per week: 32						Total Credit:24	Total Marks: 600			

**TABLE-1
ELECTIVE-I**

S.NO.	COURSE CODE	COURSE TITLE
1	SCA04451-A	Computer Graphics
2	SCA04451-B	Information Security
3	SCA04451-C	R Programming Language



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Java Programming			
Course Code	SCA04401			
Course Credits	LT	P	TC	
	31	-	4	
Prerequisites	Students must know basic concept of about OOP's, C Language and C++ Language.			
Course Objectives	<ul style="list-style-type: none">• Students should be able to understand the basic knowledge of Java Programming and its Structure.• The use of Java in a variety of technologies and on different platforms.			
Course Contents	<p>UNIT – I: Introduction Introduction: Genesis of java, importance to the Internet, overview of features OOP: OOP features, data types, control structures, arrays, methods and classes, nested & inner classes, string and String Buffer class, Wrapper Class, vectors.</p> <p>UNIT-II: Inheritance Inheritance: Basics type, method Override, using abstract and final classes, using super. Packages and Interfaces: Defined CLASSPATH, importing packages, implementing interface.</p> <p>UNIT – III: Exception Handling Exception Handling: Fundamental: exception types, using try and catch, throwing exceptions, defined exceptions. Multi-threaded Programming: Java spread model, creating threads, and thread priorities, synchronization. Suspending resuming and stopping threads.</p> <p>UNIT –IV: Input/Output Input/Output: Basic Streams, Byte and Character Stream, predefined streams, reading and writing from console and files. Using standard Java Packages(lang,util,io) Networking: Basics. TCP/IP client server sockets, URL connection. JDBC: Setting the JDBC connectivity with the backend database.</p> <p>UNIT-V : Applets Applets: Fundamentals, life cycle, overriding update, HTML APPLET tag, passing parameters. Developing single applets. Introduction to AWT: Window fundamentals, creating windowed, programs waking with graphics, using AWT controls, menus. Delegation event model, handling mouse and keyboard events.</p>			



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Outcomes	<ul style="list-style-type: none">• After completion of this course the students will be able to apply their basic knowledge of Java programming.• The student will be able to: Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. Read and make elementary modifications to Java programs that solve real-world problems.
Text Books	<ol style="list-style-type: none">1. Java complete reference - by Patrick naughten & MesutScpddt. [TMH]2. Java Primer - by E.Balaguruswami.3. Johannes Gehrke, TATA McGraw Hill 3rd Edition.4. Java Programming - Khalid Mughal
Reference Books	<ol style="list-style-type: none">1. JAVA: The Complete Reference by Naughton & Schildt - Tata McGraw Hill,19992. An Introduction to Java Programming by Daniel Liang Y - , Prentice-Hall India, 1999



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Computer Architecture			
Course Code	SCA04402			
Course Credits	LT	P	TC	
	3	1	-	4
Prerequisites	Students must know basic concept of about computer and cables.			
Course Objectives	<ul style="list-style-type: none">• The overall objective with the course is to understand basic working principles of computer hardware units and give knowledge and insights into the design of modern computers, in particular the processor design including parallel computational pipelines and memory hierarchies.• Understand concepts of register transfer logic and arithmetic operations and understand different types of addressing modes and memory organization.• Learn the different types of serial communication techniques. Summarize the Instruction execution stages.			
Course Contents	<p>UNIT- I: BASIC STRUCTURE OF COMPUTERS</p> <p>BASIC STRUCTURE OF COMPUTERS: Functional units, Basic operational concepts, Bus structures Addressing modes, subroutines: parameter passing, Instruction formats, expanding Op-codes method. BASIC PROCESSING UNIT: bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Micro-programmed Control, microinstruction format, Bit slice concept.</p> <p>UNIT-II: ARITHMETIC</p> <p>ARITHMETIC: Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth's Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.</p> <p>UNIT- III: THE MEMORY SYSTEM</p> <p>THE MEMORY SYSTEM: Various technologies used in memory design, higher order memory design, multi module memories and interleaving, Associative Memory, Cache memory, Virtual Memory.</p> <p>UNIT-IV: INPUT/OUTPUT ORGANIZATION</p>			



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>INPUT/OUTPUT ORGANIZATION: I/O-mapped I/O and memory-mapped I/O, interrupts and interrupt handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access</p> <p>COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.</p> <p>UNIT-V: RISC Philosophy</p> <ul style="list-style-type: none">● RISC Philosophy: Pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations, Basic concepts in parallel processing & classification of parallel architectures, Vector Processing, Array Processors.
Course Outcomes	<ul style="list-style-type: none">● To be able to describe the basic hardware components of a computer system.● To be familiar with the binary and hexadecimal number systems including computer arithmetic.● To be familiar with the functional units of the processor such as the register file and arithmetic-logical unit.● Be familiar with the basics of systems topics: parallel, pipelined, superscalar, and RISC/CISC architectures.● To be familiar with the representation of data, addressing modes, an instruction sets
Text Books	<ol style="list-style-type: none">1. Computer Organization, V.C.Hamacher, Z.G.Vranesic and S.G.Zaky, McGraw Hill,5th Edition,2002.2. Computer Architecture & Organization, 3rdEdition, J.P. Hayes, McGraw-Hill.
Reference Books	<ol style="list-style-type: none">1. Computer System Architecture & Organisation, Dr. Usha, Wiley India2. Computer System and Architecture, M. Mano, Pearson Education India.3. Computer Organization & Architecture, W. Stallings, Pearson Education India



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Computer Networks				
Course Code	SCA04403				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Students must know basic concept of about computer and cables.				
Course Objectives	<ul style="list-style-type: none"> • Build an understanding of the fundamental concepts of computer networking. • Familiarize the student with the basic taxonomy and terminology of the computer networking area. • Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in • computer networking. • Independently understand basic computer network technology. • Identify the different types of network topologies and protocols. • Enumerate the layers of the OSI model and TCP/IP. 				
Course Contents	<p>UNIT – I: Introduction</p> <p>Introduction: - OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, and MAN. Physical Layer: Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications.</p> <p>UNIT – II: Data link layer</p> <p>Data link layer: - Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM. Multiple Access Protocols, Link Layer Addressing, ARP, DHCP, Ethernet, Hubs, Bridges, and Switches. Ring Topology Physical Ring, Logical Ring.</p> <p>UNIT – III: Network Layer</p> <p>Network Layer: - Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Router, Internet Protocol (IP), IPv4 and IPv6, ICMP, Link State Routing, Distance Vector Routing, Hierarchical Routing, RIP, OSPF, BGP, Broadcast and Multicast Routing, MPLS, Mobile IP, IP sec.</p>				



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>UNIT – IV: Transport Layer</p> <p>Transport Layer: - Transport Layer Services, Multiplexing and Demultiplexing, UDP, Reliable Data Transfer, Go Back - N and Selective Repeat. Connection - Oriented Transport: TCP, Segment Structure, RTT estimation, Flow Control, Connection Management, Congestion Control, TCP Delay Modelling, SSL and TLS. Integrated and Differentiated Services</p> <p>UNIT – V: Application Layer</p> <p>Application Layer: - Principles of Network Applications, The Web and HTTP, FTP, Electronic Mail, SMTP, Mail Message Formats and MIME, DNS, Socket Programming with TCP and UDP. Multimedia Networking: Internet Telephony, RTP, RTCP RTSP. Network Security: - Principles of Cryptography, Firewalls, Application Gateway.</p>
Course Outcomes	<ul style="list-style-type: none">● After completion of this course the students will be able to apply for basic knowledge about Network functions.● Understand the concepts of Data Communication.● Study the functions of OSI Layers.● Familiarize with the Transmission Media, Flow Control and Error Detection & Correction.● Understand fundamental concepts in Routing, Addressing & working of Transport Protocols.● Gain familiarity with common networking & Application Protocols.● Understand Wireless LANs & Wireless Sensor Networks Operation.
Text Books	<ol style="list-style-type: none">1. Data Communications and Networking – Behrouz A. Forouzan. Third Edition.2. James F. Kurose and Keith W. Ross.
Reference Books	<ol style="list-style-type: none">1. Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson.● Financial Accounting B.Com First Year CCS University Meerut New syllabus Academic Year Dr. S.M. Shukla.



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Software Engineering			
Course Code	SCA04404			
Course Credits	L	T	P	T C
	3	1	-	4
Prerequisites	Students must know basic concept of about programming languages, C Language, C++ Language.			
Course Objectives	<p>At the completion of the course students shall be able to understand the development process of software engineering.</p> <ul style="list-style-type: none"> • different software process models, • project planning, • project scheduling, • software risk analysis, • Quality assurance and software testing. 			
Course Contents	<p>UNIT-I: Introduction to Software Engineering</p> <p>Introduction to Software Engineering: The Evolving Role of Software, The Changing Nature of Software, Software Myths and A Generic View of Software: A layered Technology, Process framework, The Capability Maturity Model Integration (CMMI), Process Patterns.</p> <p>UNIT-II: Process Models</p> <p>Process Models: The Waterfall Model, Incremental Process Models, The RAD Model, And evolutionary Software Process Models: Prototyping, The Spiral Model, Concurrent Development Model, and Specialized Process Models: Component-Based Development, Aspect oriented Software Development.</p> <p>UNIT-III: Software project planning & Designing</p> <p>Software project planning: Project planning objectives, Software scope, Empirical estimation models The Make/Buy Decision.</p> <p>Designing: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure, Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented, Design, Top-Down and Bottom-Up Design.</p>			



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>UNIT-IV: Risk Analysis & Management</p> <p>Risk Analysis & Management: Software risks, Risk identification, and Risk projection, Risk mitigation monitoring, management (RMMM Plan), Software Quality Assurance (06), Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, and Formal Approaches to SQA.</p> <p>UNIT – V: Software Testing</p> <p>Software Testing: Test Strategies for Conventional Software, Software testing fundamentals, White-box testing, black box.</p>
Course Outcomes	<p>After completion of this course, the students would be able to</p> <ul style="list-style-type: none">• Select and implement different software development process models• Extracting and analyzing software requirements specifications for different projects Developing some basic level of software architecture/design <p>Applying standard coding practices, Identification and implementation of the software metrics Defining the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.</p>
Text Books	<ol style="list-style-type: none">1. Software Engineering: A practitioner's Approach, Roger S Pressman, sixth edition. McGrawHill International Edition, 20052. Software Engineering, Ian Sommerville, seventh edition, Pearson education,2004
Reference Books	<ol style="list-style-type: none">1. Software Engineering,A Precise Approach,Pankaj Jalote, Wiley India 2010.2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 20083. Fundamentals of Software Engineering,Rajib Mall,PHI, 20054. Software Engineering, Principles and Practices,Deepak Jain,Oxford University Press.5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Computer Graphics			
Course Code	SCA04451A			
Course Credits	LT	P	TC	
	3 1	-	4	
Prerequisites	Students must know basic concept of about computer, cables, C Language.			
Course Objectives	<p>At the completion of the course student shall be able to:-</p> <ul style="list-style-type: none"> • To give an understanding of fundamentals algorithm for output primitive • To make students learn what type of operation can be applied on graphical objects. • How they are applied to give an understanding of surface rendering for realistic images for developing. • Graphical application to make students aware of fundamentals of multimedia concepts. • To learn principles of compression techniques for still images and video 			
Course Contents	<p>UNIT-I: Fundamentals of Computer Graphics Fundamentals of Computer Graphics: Concepts and applications, Random and Raster scan devices, input-output devices: CRT, LCD, laser printer. Output primitives: Line drawing algorithm: DDA and Bresenham's;</p> <p>UNIT-II: Transformation, viewing, Clipping Transformation, viewing, Clipping: 2-D Transformation: Translation, scaling, rotation, reflection, shear, Matrix representation of all homogeneous coordinates, composite transformations. Two dimensional viewing: Viewing pipeline Window-to-viewport transformation. Clipping operations: Line Clipping, Polygon Clipping</p> <p>UNIT-III: 3D Transformation, Visible Surface Detection and curves 3D Transformation, Visible Surface Detection and curves: Visible Surface detection Algorithm: Object based and image based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Depth Sorting Method Area subdivision method. 3-D Transformation: translation, scaling, rotation, reflection.</p> <p>UNIT-IV: Color Models and Basic Concept of Animation</p>			



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>Color Models and Basic Concept of Animation: Introduction of multimedia: Properties and applications, types of medium, data stream characteristics, Basic File and Data format: BMP, JPEG, GIF, TIFF. Color models: RGB, CMY.</p> <p>UNIT-V: Multimedia Systems</p> <p>Multimedia Systems: Data compression: storage space, coding requirements. Source, entropy and hybrid coding some basic compression techniques: run length code, Huffman code & Huffman Encoding, LWZ compression, JPEG, MPEG.</p>
Course Outcomes	<p>This course student will be able to</p> <ul style="list-style-type: none">• Implement the logic of drawing basic output primitive while developing a graphical package.• Students will have the ability to apply various 2d and 3d transformation concepts on objects.
Text Books	<ol style="list-style-type: none">1. Computer Graphics by Donald Hearn & M. Pauline Baker PHI2. Multimedia Computing communication & applications "By Ralf Steimnety & Kerla Neshtudt. Prince Hall.
Reference Books	<ol style="list-style-type: none">1. Principles of interactive compo Graphics; W.M. Newman & Robert F Sproull. Computer Graphics By Rogers TMH2. Introductions to Computer Graphics Anirban Mukhopadhyay Arup Chattopadhyay Schaum's outlines -computer Graphics McGraw Hill International Edition.



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Information Security				
Course Code	SCA04451B				
Prerequisites	Students must be aware of Cyber crimes.				
Course Credits	L	T	P	TC	
	3	1	-	4	
Course Objectives	<ul style="list-style-type: none"> By the completion of this course, students will be able to understand different cyber-crime and be aware of cyber law. He can also understand basics of E-security, type of attack and digital Signatures. 				
Course Contents	<p>UNIT – I: E-Security</p> <p>E-Security –Overview-security, Principles of security, Attack methods: the difference between targeted attacks and target-of opportunity attacks, Types of attacks, Denial-of-service attacks, Target-of-opportunity malware, attacks, Intruders: intrusion detection.</p> <p>UNIT – II: Introduction to cyber laws</p> <p>Introduction to cyber laws: Introduction Cyber-crimes and cyber laws, Information Technology act 2000. Cyber Regulation Advisory committee– Violation, damages and penalties–Cyber flying, The cyber regulation Appellate Tribunal [composition, qualifications, powers and rights.</p> <p>UNIT – III: Cyber-crime, criminal justice, cyber squatters and copyright protection</p> <p>Cyber-crime, criminal justice, cyber squatters and copyright protection : Introduction Hacking with case studies, Cyber Fraud and cheating, Virus on the internet, Defamation Harassment and E-mail abuse with case study, Cyber pornography, Other IT offence, Jurisdiction and cyber-crime, case study, Concept of Domain name and reply to cyber squatters, Copy right in fragment, remedies and offences, Computer software privacy.</p> <p>UNIT – IV: E-commerce Taxation</p>				



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>E-commerce Taxation: Introduction E-commerce, finding the P E in cross border E-commerce, the impact of the internet on customer duties, Taxation policies in India.</p> <p>UNIT – V: Digital Signature</p> <p>Digital Signature: Introduction Digital Signatures, Digital Signature certificate, Certifying authorities and liability in the event of digital Signature compromise.</p>
Course Outcomes	<ul style="list-style-type: none">• This course student will be able to understand all Security systems & Cyber Law.• Students must know about Digital Signature.
Text Books	<ol style="list-style-type: none">1. Cryptography and Network Security Principle and Practice 3rd Edition by William Stalling Pearson.2. Cyber law: The Indian Perspective" by Pavan Duggal, Saakshar Law Publications3. Cryptography and Network Security Principle 2nd edition by atul kahte
Reference Books	<ol style="list-style-type: none">1. Cyber law simplified – vivek sood (TMH)2. Corporate Computer and Network Security by Raymond R Panko, Pearson Publications



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	R Programming Language			
Course Code	SCA04451C			
Cours e Credit s	L	T	P	TC
	3	1	-	4
Prerequisites	Students must be aware of Cyber crimes.			
Course Objectives	<ul style="list-style-type: none"> Students must know the concept of data interpret, statistics and patterns. 			
Course Contents	<p>UNIT – I: Introduction to Data analytics, Basic Statistics and Distribution Introduction to Data analytics: Overview of Big-data, Need of Data Analytics, Applications of Data Analytics, Datasets, tools for data analytics Basic-Statistics: Mean, Median, mode, Standard Deviation, Variance, Correlation. Distribution: normal, binomial.</p> <p>UNIT-II: Introduction to R and R Data Structures Introduction to R: R overview and history, Basic features of R, Installing R, packages in R, Getting started: Window section of R-Studio, first interaction, command line versus scripts, comments. Variables in R: Naming variables, assigning values to variables, finding variables, removing variables, and operators. R Data Structures: Vectors, Character Strings, Matrices, Lists, Data Frames, and Classes.</p> <p>UNIT-III: Input of Data, Functions and Decision making structure Input of Data: input of data from terminal, input of data through R-objects. Output Functions: print () function, cat () function. In-Built functions in R: Mathematical functions, String functions. User defined functions ñ function without arguments, function with arguments. Decision making structure: simple if statement, if-else statement, switches statement. Loops: while loop, for loop, Repeat loop.</p> <p>UNIT-IV: Data Types of R Vectors & Matrices Data Types of R Vectors: class of a vector, Elements of a vector, accessing vector elements, functions for vectors, obtaining the Length of a Vector. Common vector operations: Arithmetic & logical operations, Vector Indexing, using all () and any () functions, Vectorized operations, NA and NULL values. Matrices: creating a matrix, accessing matrix elements,</p>			



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>functions for matrices, matrix indexing, filtering on matrices. Arrays: creating an array, accessing elements of an array, functions for array.</p> <p>UNIT-V: Lists, Import and Export of data and Data Visualization techniques</p> <p>Lists: creating a list, accessing list elements, functions for list, General list operations, list indexing, adding and deleting list elements. Import and Export of data: Import and export of data in excel file:reading from excel format, write to excel format.</p> <p>Data Visualization Techniques: Introduction, pie chart, bar chart, scatter and box plots.</p>
Course Outcomes	<ol style="list-style-type: none">1. After completing the course, students will learn Exposure to theory as well as practical knowledge through R used in data analytics.2. Fundamental basics of statistics used in analyzing the data3. How to find the pattern in the given dataset4. How to interpret the data graphically.5. How to apply different types of algorithms for the given dataset
Text Books	<ol style="list-style-type: none">1. Data-Visualization tools and techniques offer executives and other knowledge workers new approaches2. Data visualization is a general term that describes any effort to help people understand the significance of data by placing it in a visual context.
Reference Books	<ol style="list-style-type: none">1. Data Analytics with R, WILEY Publishing , Dr.Bharti Motwani.2. The Art of R Programming by Norman Matlof, No starch press, SAN FRANCISCO,2011.3. Data Analytics using R, McGrawHill Publications, Seema Acharya



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	Java Programming Lab				
Course Code	SCA04491				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Students must be aware of Java programming concepts				
Course Objectives	<ul style="list-style-type: none">• To be able to professionally choose the best algorithm and data structure for a particular set of resource constraints takes practice.• An emphasis on learning by doing is used throughout Data Structures in Java: A Laboratory Course. In each laboratory, you explore a particular data structure by implementing it.• As you create an implementation, you learn how the data structure works and how it can be applied. The resulting implementation is a working piece of software that you can use in later laboratories and programming projects.				
Course Contents	<ol style="list-style-type: none">1. Write a program to check whether a number is an Armstrong number or not.2. Write a program to sort a stream of Strings.3. Write a program to perform multiplication of two matrices.4. Write a program to find the volume of a box having its side w, h, d means width, height and depth. Its volume is $v=w*h*d$ and also find the surface area given by the formula $s=2(w*h+h*d+d*w)$, use appropriate constructors for the above.5. Develop a program to illustrate a copy constructor so that a string may be duplicated into another variable either by assignment or copying.6. Create a base class called shape. It contains two methods <code>getxyvalue()</code> and <code>showxyvalue()</code> for accepting co-ordinates and to display the same. Create the subclass called Rectangle which contains a method to display the length and breadth of the rectangle called <code>showxyvalue()</code>. Use overriding concept.7. Write a program that creates an abstract class called dimension, creates two subclasses, rectangle and triangle. Include appropriate methods for both the subclass that calculate and display the area of the rectangle and triangle.8. Write a program which throws Arithmetic Exception. Note the output; write another class (in a different file) that handles the Exception.				



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

	<p>9. Create a user defined Exception class which throws Exception when the user inputs the marks greater than 100.</p> <ol style="list-style-type: none">10. Write a program in which a Mythread class is created by extending the <ul style="list-style-type: none">• Thread class. In another class, create objects of the Mythread class and run them. In the run method print “SRU” 10 times. Identify each thread by setting the name.
Course Outcomes	<ul style="list-style-type: none">• Have a comprehensive knowledge of the data structures and algorithms on which file structures and databases are based.• Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.• Read and make elementary modifications to Java programs that solve real- world problems.• Validate input in a Java program.
Text Books	<ol style="list-style-type: none">1. Java complete reference - by Patrick naughten & MesutScpddt. [TMH]2. Java Primer - by E.Balaguruswami. <ul style="list-style-type: none">• Johannes Gehrke, TATA McGraw Hill 3rd Edition. Java Programming - Khalid Mughal
Reference Books	<ol style="list-style-type: none">1. JAVA: The Complete Reference by Naughton & Schildt - Tata McGraw Hill,1999 <ul style="list-style-type: none">• An Introduction to Java Programming by Daniel Liang Y - , Prentice-Hall India, 1999



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Course Title	R Programming Language			
Course Code	SCA04492			
Course Credits	L	T	P	TC
	-	-	4	2
Prerequisites	Students must know basic concept of Excel, factorial, Mean & Mode .			
Course Objectives	Students should be able to understand the basic knowledge of R Programming.			
Course Contents	List of Practical's			
	<ol style="list-style-type: none"> 1. Write a program in R. To compute the product of two values. 2. Write a program in R. to check whether the given number is even or odd. 3. Write a program in R. Sum of natural numbers. 4. Write a program in R. Find the factorial. 5. Exporting data to Excel, Text File 6. Mean, Median, Standard Deviation, Variance, Correlation in R 7. Correlation in R:Pearson & Spearman with Matrix Example 8. T Test in R 9. Chi-Square Test in R 10. Prediction using linear regression and visualizing the regression graphically 			
Course Outcomes	<ul style="list-style-type: none"> • Data-Visualization tools and techniques offer executives and other knowledge workers new approaches • Data visualization is a general term that describes any effort to help people understand the significance of data by placing it in a visual context. 			
Text Books	<ol style="list-style-type: none"> 1. The Book of R: A First Course in Programming and Statistics: Tilman M. Davies. 2. R For Dummies, Andrie de Vries, Joris Meys 			



Shri Rawatpura Sarkar University, Raipur

Bachelors of Computer Application

Semester-IV

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2022-2023)

Reference Books	<ol style="list-style-type: none">1. Rumset D. J. (2010): Statistical Essentials for Dummies. Hoboken: Wiley Publishing2. R for Data Science: Import, Tidy, Transform, Visualize, and Model Databy adley ickham , O'Reilly
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