Session: 2023-24			
Part A - Introduction			
Subject	BCA		
Semester	Ι		
Name of the Course	Problem Solving th	rough C	
Course Code	B23-CAP-101 (Co 101, B23-CT	mmon with B23-CAI S-101)	-101, B23-CDS-
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	СС		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 urse Learning Outcomes(CLO): After completing this course, the learner will be able to: learn the basics of C program, data types and input/output statements. understand different types of operators, their hierarchies and also control statements of C. implement programs using arrays and strings. get familiar with advanced concepts like structures, union etc. in C language. 		
	5*. to implement concepts of	the programs based of C.	on various
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Time: 3 Hrs.(T), 3Hrs.(P) Internal Assessment Marks:30(20(T)+10(P)) Time: 3 Hrs.(T), 3Hrs.(P) End Term Exam Marks: 70(50(T)+20(P)) Time: 3 Hrs.(T), 3Hrs.(P)			3Hrs.(P)
Part B- Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit			

Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First

question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
Ι	Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant. Input/output: Formatted I/O Function-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().	10
П	Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators Operator Hierarchy; Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion. Decision making with if statement, if- else statement, nested if statement, else-if ladder, switch and break statement, goto statement, Looping Statements: for, while, and do- while loop, jumps in loops.	10
III	 Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation. Functions: definition, prototype, function call, passing arguments to a function: call by value; call by reference, recursive functions. Strings: Declaration and Initialization, String I/O, Array of Strings, String Manipulation Functions: String Length, Copy, Compare, Concatenate etc., Search for a Substring. 	10
IV	Pointers in C: Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays. User defined data types: Structures - Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, Array of Structures; Unions - Union definition; difference between Structure and Union.	10
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: To read radius of a circle and to find area and circumference To read three numbers and find the biggest of three To check whether the number is prime or not To read a number, find the sum of the digits, reverse the number and check it for palindrome To read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers To read percentage of marks and to display appropriate message (Demonstration of else-if ladder) To find the roots of quadratic equation To read marks scored by n students and find the average of 	25

		[]
	 marks (Demonstration of single dimensional array) To remove Duplicate Element in a single dimensional Array To perform addition and subtraction of Matrices To find factorial of a number To generate Fibonacci series To remove Duplicate Element in a single dimensional Array To find the length of a string without using built in function To demonstrate string functions To read, display and add two m x n matrices using functions To read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters To Swap Two Numbers using Pointers To demonstrate student structure to read & display records of n students 	
	• To demonstrate the difference between structure & union.	
	Suggested Evaluation Methods	
Intern > T • • • • • • • • • • • • •	al Assessment: heory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 Mid-Term Exam: 10 racticum Class Participation: 5 Seminar/Demonstration/Viva-voce/Lab records etc.: 5 Mid-Term Exam: NA	End Term Examination: A three hour exam for both theory and practicum.
	Part C-Learning Resources	
Recon	nmended Books/e-resources/LMS: Gottfried, Byron S., Programming with C, Tata McGraw Hill. Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill. Ieri R. Hanly & Elliot P. Koffman, Problem Solving and Program Desig Wesley. Yashwant Kanetker, Let us C, BPB. Rajaraman, V., Computer Programming in C, PHI. Yashwant Kanetker, Working with C, BPB.	gn in C, Addison

Session: 2023-24			
Part A - Introduction			
Subject	BCA		
Semester	Ι		
Name of the Course	Foundations of Cor	nputer Science	
Course Code	B23-CAP-102 (Con 101, B23-CT	B23-CAP-102 (Common with B23-CAI-101, B23-CDS- 101, B23-CTS-101)	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. understand the basics of computer 2. learn about I/O devices and operating systems 3. understand internet and its services 4. learn about the threats and security concepts on computers 		
5*. to understand the working of operating system, internet and security related concepts.			ating system, cepts.
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Time: 3 Hrs.(T), 3Hrs.(P) Internal Assessment Marks:30(20(T)+10(P)) Time: 3 Hrs.(T), 3Hrs.(P) End Term Exam Marks: 70(50(T)+20(P)) Time: 3 Hrs.(T), 3Hrs.(P)		3Hrs.(P)	
Part B- Contents of the Course			
Instructions for Paper- Setter			

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of

three-ho	three-hour duration.			
Unit	Topics	Contact Hours		
Ι	Computer Fundamentals: Evolution of Computers through generations, Characteristics of Computers, Strengths and Limitations of Computers, Classification of Computers, Functional Components of a Computer System, Applications of computers in Various Fields. Types of Software: System software, Application software, Utility Software, Shareware, Freeware, Firmware, Free Software. Memory Systems: Concept of bit, byte, word, nibble, storage locations and addresses, measuring units of storage capacity, access time, concept of memory hierarchy. Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory.	10		
Π	I/O Devices: I/O Ports of a Desk Top Computer, Device Controller, Device Driver. Input Devices: classification and use, keyboard, pointing devices - mouse, touch pad and track ball, joystick, magnetic stripes, scanner, digital camera, and microphone Output Devices: speaker, monitor, printers: classification, laser, ink jet, dot-matrix. Plotter. Introduction to Operating System: Definition, Functions, Features of Operating System, Icon, Folder, File, Start Button, Task Bar, Status Buttons, Folders, Shortcuts, Recycle Bin, Desktop, My Computer, My Documents, Windows Explorer, Control Panel.	10		
III	The Internet: Introduction to networks and internet, history, Internet, Intranet & Extranet, Working of Internet, Modes of Connecting to Internet. Electronic Mail: Introduction, advantages and disadvantages, User Ids, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.	10		
IV	Threats: Physical & non-physical threats, Virus, Worm, Trojan, Spyware, Keylogers, Rootkits, Adware, Cookies, Phishing, Hacking, Cracking. Computer Security Fundamentals: Confidentiality, Integrity, Authentication, Non-Repudiation, Security Mechanisms, Security Awareness, Security Policy, anti-virus software & Firewalls, backup & recovery.	10		
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Operating System: Starting with basics of Operating Systems and its functionalities Computer Basics: Identify the various computer hardware Understanding the working of computer Understanding various types of software 	25		

Internet and E-mail: • Using Internet for various tasks • Creating and using e-mail. Security: • Understanding various threats • How to be safe from virus threats • Various software to get safe from virus attacks.	
Suggested Evaluation Methods	
Internal Assessment: > Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 > Practicum • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	End Term Examination: A three hour exam for both theory and practicum.
Part C-Learning Resources	
 Recommended Books/e-resources/LMS: Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB. Dromey, R.G., How to Solve it By Computer, PHI. Norton, Peter, Introduction to Computer, McGraw-Hill. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon T Rajaraman, V., Fundamentals of Computers, PHI. 	ech World.

Session: 2023-24			
Part A - Introduction			
Subject	BCA		
Semester	Ι		
Name of the Course	Logical Organization	on of Computer	
Course Code	B23-CAP-103 (Con 101, B23-CT	B23-CAP-103 (Common with B23-CAI-101, B23-CDS- 101, B23-CTS-101)	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	СС		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	Basic Knowledge of Mathematics (10 th Level)		
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. understand number systems, error detecting correcting code and representations of numbers in a computer system. 2. understand computer arithmetic and Boolean algebra and simplification of Boolean expressions. 3. understand working of logic gates and design various combinational circuits using these logic gates. 4. understand working of different types of flip-flops and design different types of registers. 5*. to understand the practical aspects of logical 		
Cradita	organization of computer.		
Credits			
Contact Hours	3	1	5
Contact Hours 5 2 5 Max. Marks:100(70(T)+30(P)) Time: 3 Hrs.(T), 3Hrs.(P) Internal Assessment Marks:30(20(T)+10(P)) Time: 3 Hrs.(T), 3Hrs.(P) End Term Exam Marks: 70(50(T)+20(P)) Time: 3 Hrs.(T), 3Hrs.(P)		3 Hrs.(P)	
Part B- Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory			

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
Ι	Number Systems: Binary, Octal, Hexadecimal etc. Conversions from one number system to another, BCD Number System. BCD Codes: Natural Binary Code, Weighted Code, Self- Complimenting Code, Cyclic Code. Error Detecting and Correcting Codes. Character representations: ASCII, EBCDIC and Unicode. Number Representations: Integer numbers - sign-magnitude, 1's & amp; 2's complement representation. Real Numbers normalized floating point representations.	10
II	Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Compliment representations, Addition and subtraction with BCD representations. Boolean Algebra: Boolean Algebra Postulates, basic Boolean Theorems, Boolean Expressions, Boolean Functions, Truth Tables, Canonical Representation of Boolean Expressions: SOP and POS, Simplification of Boolean Expressions using Boolean Postulates & amp; Theorems, Kaurnaugh-Maps (upto four variables), Handling Don't Care conditions.	10
III	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. Their symbols, truth tables and Boolean expressions. Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtracor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	10
IV	Sequential Circuits: Basic Flip- Flops and their working. Synchronous and Asynchronous Flip –Flops, Triggering of Flip- Flops, Clocked RS, D Type, JK, T type and Master-Slave Flip-Flops. State Table, State Diagram and State Equations. Flip-flops characteristics & Excitation Tables. Sequential Circuits: Designing registers –Serial-In Serial-Out (SISO), Serial-In Parallel-Out (SIPO), Parallel-In Serial-Out (PISO) Parallel-In Parallel-Out (PIPO) and shift registers.	10
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Number System: Problems based on Number System and their conversion. Programs based on Number System conversion. Binary Arithmetic Problems based on Binary Arithmetic. 	25

	 Programs based on Binary Arithmetic. Problems based on Boolean Expression and their simplification Logic Gates Understanding working of logic Gates. Combinatorial Circuits: Designing and understanding various combinational circuits. Sequential Circuits: Designing and understanding various sequential circuits. 	
	Suggested Evaluation Methods	
Intern > T • • • • • • • • • •	hal Assessment: heory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 Mid-Term Exam: 10 racticum Class Participation: 5 Seminar/Demonstration/Viva-voce/Lab records etc.: 5 Mid-Term Exam: NA	End Term Examination: A three hour exam for both theory and practicum.
	Part C-Learning Resources	
Record	nmended Books/e-resources/LMS: M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Hall. Andrew S. Tanenbaum, Structured Computer Organization, Prentice I Ltd. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McG	India Pvt. Ltd. Design, Prentice Hall of India Pvt. raw-Hill.

Session: 2023-24			
Part A - Introduction			
Subject	BCA		
Semester	Ι		
Name of the Course	Mathematical Foun	dations for Compute	er Science-I
Course Code	B23-CAP-104 (Con 101, B23-CT	B23-CAP-104 (Common with B23-CAI-101, B23-CDS- 101, B23-CTS-101)	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	СС-М		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes (CLO):	 After learning this course student will be able: 1. Gain the knowledge of set theory, types of sets and operations on sets. Understand various concepts of matrices and determinants, and acquire the cognitive skills to apply different operations on matrices and determinants. 2. Have the knowledge of the basic concepts of complex numbers and acquire skills to solve linear quadratic equations. 3. Gain the knowledge of the concepts of Arithmetic progression, Geometric progression and Harmonic progression, and find A.M., G.M. and H.M. of given numbers. 4. Understand the concept of differentiation 5. * Attain the skills to make use of the learnt concepts of Introductory Mathematics in multidisciplinary learning contexts and to know their applications 		
Credits	Theory	Practical	Total
	1	1	2
Contact Hours	1	2	3
Max. Marks:50(30(T)+20(P)) Internal Assessment Marks:15(10(T)+5(P)) End Term Exam Marks:35(20(T)+15(P))Time: 3 Hrs.(T), 3Hrs.(P)			
Part B-Contents of the Course			

Instructions for Paper- Setter			
Unit	Topics	Contact Hours	
Ι	Sets and their representations, Empty set, Finite and infinite sets, Subsets, Equal sets, Power sets, Universal set, Union and intersection of sets, Difference of two sets, Complement of a set, Venn diagram, De-Morgan's laws and their applications.	4	
Π	An introduction to matrices and their types, Operations on matrices, Symmetric and skew-symmetric matrices, Minors, Co-factors. Determinant of a square matrix, Adjoint and inverse of a square matrix, Solutions of a system of linear equations up to order 3.	4	
III	Quadratic equations, Solution of quadratic equations. Arithmetic progression, Geometric progression, Harmonic progression, Arithmetic mean (A.M.), Geometric mean (G.M.), Harmonic mean (H.M.), Relation between A.M., G.M. and H.M.	4	
IV	The concept of differentiation, differentiation of simple functions, Use of differentiation for solving problems related to real-life situations. Differentiation of simple algebraic, trigonometric and exponential functions.	4	
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Problem Solving- Questions related to the practical problems based on following topics will be worked out and record of those will be maintained in the Practical Note Book: Problems related to union, intersection, difference and complement of sets. Problems based on De Morgan's Laws. Problems related to Venn diagrams. Problems to find inverse of a matrix. Problems to find determinant of a square matrix of order 3. Problems to find sum of n terms of A.P., G.P. and H.P. Problems to find A.M., G.M. and H.M. of given numbers. Problems involving formulation and solution of quadratic equations in one variable. 	25	
	Suggested Evaluation Methods		
Intern > T	nal Assessment: Theory Class Participation: 4	End Term Examination: A three hour exam	

 Seminar/presentation/assignment/quiz/class test etc.: NA Mid-Term Exam: 6 	for both theory and practicum.	
> Practicum		
 Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc : 5 		
 Mid-Term Exam: NA 		
PartC-Learning Resources		
Text /Reference Books:C. Y. Young (2021). <i>Algebra and Trigonometry</i>. Wiley.		
• S.L. Loney (2016). The Elements of Coordinate Geometry (Cartesian Coordinates) (2 nd		
Edition). G.K. Publication Private Limited.		
• Seymour Lipschutz and Marc Lars Lipson (2013). <i>Linear Algebra</i> . (4 th Edition)		
Schaum's Outline Series, McGraw-Hill.		
• C.C. Pinter (2014). A Book of Set Theory. Dover Publications.		
• J. V. Dyke, J. Rogers and H. Adams (2011). Fundamentals of Mathematics (10 th Edition),		
Brooks/Cole.		
• A. Tussy, R. Gustafson and D. Koenig (2010). <i>Basic Mathematics</i> (4 th Edition). Brooks Cole	s for College Students	

Session: 2023-24				
F	Part A - Introduction			
Subject	BCA			
Semester	II			
Name of the Course	Object Oriented Pro	ogramming using C+	+	
Course Code	B23-CAP-201 (Common with B23-CAI-201, B23-CDS- 201, B23-CTS-201)			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC			
Level of the course (As per Annexure-I	200-299			
Pre-requisite for the course (if any)	B23-CAP-101			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: learn the input/output statements and functions in C++. get familiar with OOPS concepts along with constructors and destructors in C++ language. Learn the various concepts of operator overloading and inheritance. get familiar with concepts of virtual functions and exception handling in C++ language. 5*. to implement the programs based on various concepts of C++. 			
Credits	Theory	Practical	Total	
	3	1	4	
Contact Hours 3 2 5 Max. Marks:100(70(T)+30(P)) Time: 3 Hrs.(T), 3Hrs.(P) Internal Assessment Marks:30(20(T)+10(P)) Time: 3 Hrs.(T), 3Hrs.(P)		5 BHrs.(P)		
Part B- Contents of the Course				
Instructions for Paper-Setter The examiner will set a total of nine questions. Out of which, the first question will be compulsory.				

The examiner will set a total of nine questions. Out of which, the first question will be compulsory. The remaining eight questions will be set from four units selecting two questions from each unit. The examination will be of three-hour duration. All questions will carry equal marks. The first question will comprise short answer-type questions covering the entire syllabus. The candidate will have to attempt five questions, selecting one from each unit. First

question will be compulsory. The practicum will be evaluated by an external and an internal examiner. The examination will be ofthree-hour duration.

Unit	Topics	Contact Hours
Ι	Input Output in C++ : Unformatted and Formatted I/O Operations. I/O using insertion and extraction operators and streams in C++. Functions : Declaration and Definition, return values, arguments, passing parameters by value, call by reference, call by pointer, Recursion, Inline Functions, Function overloading. Pointers, structures, and union in C++.	10
Π	Object-oriented features of C++ : Class and Objects, Data hiding & encapsulation, abstraction, Data Members and Member Functions, accessing class members, empty class, local class, global class, Scope Resolution Operator and its Uses, Static Data Members, Static Member Functions, Structure vs Class, Friend function and friend class. Constructors and Destructors : Constructors, Instantiation of objects, Default constructor, Parameterized constructor, Copy constructor and its use, Destructors, Dynamic initialization of objects.	10
III	Operator Overloading: Overloading unary and binary operators: arithmetic operators, manipulation of strings using operators. Inheritance : Derived class, base class, Accessing the base class member, Inheritance: multilevel, multiple, hierarchical, hybrid; Virtual base class, Abstract class.	10
IV	Virtual Functions, pure virtual functions; Polymorphism & its types Exception Handling in C++ : exception handling model, exception handling constructs - try, throw, catch, Order of catch blocks, Catching all exceptions, Nested try blocks, handling uncaught exceptions.	10
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: Write a C++ program to print the following lines: Your introduction Your institute introduction Write a program that accepts principle, rate, and time from the user and prints the simple interest. Write a program to swap the values of two variables. Write a program to check whether the given number is even or odd (using ?: ternary operator). Write a program to check whether the given number is positive or negative (using?: ternary operator). Write a program that inputs three numbers and displays the largest number using the ternary operator. WAP to initialize data members of the class using the constructor. Pass values to the constructor and initialize the members of that class to those values. 	25

Length, Breadth, Height		
Members functions:		
• To accept the details.		
• To calculate the volume of the cube.		
• To display the details.		
• WAP to calculate the sum using constructor overloading		
 WAP to demonstrate the use of destructor 		
 Create a C++ Program to show the order of constructor and 	1	
destructor.		
• C++ Program to Find the Number of Vowels, Consonants,		
Digits, and White Spaces in a String		
C++ Program to Multiply Two Matrices by Passing Matrix	to	
Function		
Increment ++ and Decrement Operator Overloading in C	++	
Programming		
• C++ Program to Add Two Complex Numbers		
 C++ Program to Show Function Overriding C++ Program to Show Polymorphism in Class 		
 C++ Program to Show Function Overloading C++ Program to Show Function Overloading 		
 C++ Program to Show Function Overloading C++ Program to Show Inheritance 		
Suggested Evaluation Methods		
Internal Assessment:	Fnd-Term	
> Theory	Examination:A	
Class Participation: 5	three-hour exam	
 Seminar/presentation/assignment/quiz/class test etc.: 5 	for boththeory	
• Mid-Term Exam: 10	and practicum.	
➤ Practicum	End Term Exam	
Class Participation: 5	Marks:	
• Seminar/Demonstration/Viva-voce/Lab records etc.: 5	70(50(1)+20(P))	
Mid-Term Exam: NA		
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
• Herbert Scildt, C++, The Complete Reference, Tata McGraw-Hill		
Robert Lafore, Object Oriented Programming in C++, SAMS Publishing		
• Bjarne Stroustrup, The C++ Programming Language, Pearson Education		
 Balaguruswami, E., Object Oriented Programming In C++, Tata McGraw-Hill. Bishard Johnson An Introduction to Object Oriented Application Development 		
Richard Johnson An Introduction to Object Oriented Application I	Graw-Hill. Nevelopment	

Session: 2023-24				
F	Part A - Introduction	on		
Subject	BCA			
Semester	II			
Name of the Course	Introduction to We	b Technologies		
Course Code	B23-CAP-202 (Cor 202, B23-CT	B23-CAP-202 (Common with B23-CAI-202, B23-CDS- 202, B23-CTS-202)		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC			
Level of the course (As per Annexure-I	100-199			
Pre-requisite for the course (if any)				
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: learn the basics of web development. understand different types of web pages and web sites. implement HTML and CSS for web page designing. Understand the design of web crawlers and search engines. 5*. to implement the programs based on various concepts of web development 			
Credits	Theory	Practical	Total	
Contact Hours	3	2	<u> </u>	
Contact Hours 5 2 5 Max. Marks:100(70(T)+30(P)) Time: 3 Hrs.(T), 3Hrs.(P) Internal Assessment Marks:30(20(T)+10(P)) Time: 3 Hrs.(T), 3Hrs.(P) End Term Exam Marks: 70(50(T)+20(P)) Time: 3 Hrs.(T), 3Hrs.(P)				
Part B- Contents of the Course				
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus				

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of

three-ho	three-hour duration.			
Unit	Topics	Contact Hours		
Ι	Introduction to Internet and World Wide Web (WWW); Evolution and History of World Wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Browsers; Hypertext Transfer Protocol, URLs; Searching, Search Engines and Search Tools. Web Publishing: Hosting website; Internet Service Provider; Planning and designing website; Web Graphics Design, Steps For Developing website	10		
Π	Creating a Website and Introduction to Mark up Languages (HTML and DHTML), HTML Document Features & Fundamentals, HTML Elements, Creating Links; Headers; Text styles; Text Structuring; Text colour and Background; Formatting text; Page layouts, Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes, HTML5	10		
III	Introduction to CSS (Cascading Style Sheets): Features, Core Syntax, Types, Style Sheets and HTML, Style Rule Cascading and Inheritance, Text Properties, CSS Box Model, Normal Flow Box Layout, Positioning, and other useful Style Properties; Features of CSS3.	10		
IV	The Nature of JavaScript: Evolution of Scripting Languages, JavaScript-Definition, Programming for Non-Programmers, Introduction to Client–Side Programming, Enhancing HTML Documents with JavaScript. Static and Dynamic web pages	10		
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Create a web page using ordered list and unordered list. Design a web page to show your institute with hyperlinks. Create your resume on HTML page. Create a web page divide the web page into four frames. In one frame create three links that will display different HTML forms in the remaining three frames respectively. Create a web page to show the record of the college in the form of a table. Write a HTML code to add internal CSS on a webpage Design a blog-style personal website. 	25		

• Design a web page to display your college with hyperlinks.			
• Write a JavaScript function to calculate the sum of two			
numbers.			
• Write a JavaScript program to find the maximum number in			
an array.			
• Write a JavaScript function to check if a given string is a			
palindrome (reads the same forwards and backward).			
• Write a CSS file and attach it to any 3 HTML webpages.			
• Use Div and span in a page and color two words with the same colors.			
• Using HTML, CSS create a styled checkbox with animation on state change			
• Design a web page that is like a compose page of e-mail. It should have:			
a) Text boxes for To, CC, and BCC respectively.			
b) Text field for the message.			
c) Send button.			
d) Option for selecting a file for attachment			
• After clicking the send button a new page should open with the display message "Message has been sent".			
Suggested Evaluation Methods			
Internal Assessment:	End-Term		
> Theory	Examination:		
• Class Participation: 5	A three-hour		
 Seminar/presentation/assignment/qui2/class test etc.: 5 Mid Term Exam: 10 	theory and		
	practicum.		
 Practicum Class Participation: 5 	End Term		
 Class Faiturpation. 5 Seminar/Demonstration/Viva-voce/Lab records etc.: 5 	Exam Marks:		
• Mid-Term Exam: NA	70(50(T)+20(P))		
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
• Raj Kamal, Internet and Web Technologies, Tata McGraw-Hill.			
Ramesh Bangia, Multimedia and Web Technology, Firewall Media.			
• Thomas A. Powell, Web Design: The Complete Reference, Tata McGraw-Hill			
• Wendy Willard, HTML Beginners Guide, Tata McGraw-Hill.			
 Dettel and Goldberg, Internet and World Wide Web, How to Program, PHI David Elangen, JavaScript: The Definitive Civide: The Definitive Civide 			
 David Flanagan, JavaScript. The Definitive Guide. The Definitive Guide. Kogent Learning. Web Technologies: HTML JavaScript. PHP. Java JSP. XML AJAX – 			
Black Book, Wiley India Pvt. Ltd.			

Session: 2023-24				
Part A - Introduction				
Subject	BCA			
Semester	II			
Name of the Course	Concepts of Operat	ing Systems		
Course Code	B23-CAP-203 (Con 203, B23-CT	mmon with B23-CA S-203)	I-203, B23-CDS-	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC			
Level of the course (As per Annexure-I	100-199			
Pre-requisite for the course (if any)				
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: understand the basic concepts of operating systems and their services along with process management. understand the concept of process scheduling and acquire knowledge of process synchronization. learn about memory management and virtual memory concepts. learn to work with directory structure and security aspects. 5*. to implement the programs based on the appending system. 			
Credits	Theory	Practical	Total	
	3	1	4	
Contact Hours	3	2	5	
Max. Marks:100(70(T)+30(P)) Time: 3 Hrs.(T), 3Hrs.(P) Internal Assessment Marks:30(20(T)+10(P)) Time: 3 Hrs.(T), 3Hrs.(P) End Term Exam Marks: 70(50(T)+20(P)) Time: 3 Hrs.(T), 3Hrs.(P)			3Hrs.(P)	
Part B- Contents of the Course				
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question				

will comprise short answer-type questions covering the entire syllabus.

The candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

The practicum will be evaluated by an external and an internal examiner. The examination will be ofthree-hour duration.

Unit	Topics	Contact Hours
Ι	Introductory Concepts: Operating System, Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure. Types of Operating System: Real-time, Multiprogramming, Multiprocessing, Batch processing. Operating System Services, Operating System Interface, Service System Calls, and System Programs. Process Management: Process Concepts, Operations on Processes, Process States, and Process Control Block. Inter-Process Communication.	10
II	CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms, Multiple Processor Scheduling, Algorithm Evaluation. Synchronization: Critical Section Problem, Semaphores, Classical Problem of Synchronization, Monitors. Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.	10
III	Memory Management Strategies: Memory Management of Single-user and Multiuser Operating Systems, Partitioning, Swapping, Contiguous Memory Allocation, Paging and Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.	10
IV	Implementing File System: File System Structure, File System Implantation, File Operations, Type of Files, Directory Implementation, Allocation Methods, and Free Space Management. Disk Scheduling algorithm - SSTF, Scan, C- Scan, Look, C-Look. SSD Management.	10
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: Working with various operating systems, and performing different operations using operating systems. Write a program to print file details including owner access permissions, and file access time, where file name is given as argument. Write a program to copy files using system calls. 	25

	• Write a program to implement the FCFS scheduling algorithm.	
	• Write a program to implement the Round Robin scheduling algorithm.	
	• Write a program to implement the SJF scheduling algorithm.	
	• Write a program to implement a non-preemptive priority- based scheduling algorithm	
	• Write a program to implement preemptive priority-based	
	• scheduling algorithm.	
	• Write a program to implement the SRJF scheduling algorithm.	
	• Write a program to calculate the sum of n numbers using the thread library.	
	• Write a program to implement first-fit, best-fit, and worst-fit allocation strategies.	
	Suggested Evaluation Methods	
Intern ≻ T • • • • • •	nal Assessment: heory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 Mid-Term Exam: 10 racticum Class Participation: 5 Seminar/Demonstration/Viva-voce/Lab records etc.: 5 Mid-Term Exam: NA	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
	Part C-Learning Resources	
Recor	nmended Books/e-resources/LMS: Silberschatz A., Galvin P.B.,and Gagne G., Operating System Concepts Sons. Godbole, A.S., Operating Systems, Tata McGraw-Hill Publishing Com Deitel, H.M., Operating Systems, Addison- Wesley Publishing Compar	s, John Wiley & pany, New Delhi. ny, New York.
• Tanenhaum A S. Operating System- Design and Implementation Prentice Hall of India		

• Tanenbaum, A.S., Operating System- Design and Implementation, Prentice Hall of India, New Delhi.

Session: 2023-24				
Part A - Introduction				
Subject	BCA			
Semester	II			
Name of the Course	Mathematical Foun	dations for Compute	er Science-II	
Course Code	B23-CAP-204 (Cor 204, B23-CT	mmon with B23-CA S-204)	I-204, B23-CDS-	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-M	CC-M		
Level of the course (As per Annexure-I	100-199			
Pre-requisite for the course (if any)				
Course Learning Outcomes (CLO):	 After learning this course student will be able: 1. Understand the concept of integration. 2. Acquire cognitive and technical knowledge about a variety of methods of representation of statistical data 3. Understand methods of measure of central tendency. Analyze the problem and apply the best measure of central tendency to draw inferences from the available data. 4. Understand the concept of correlation, and correlation methods and conclude about the type of correlation for the available data. Comprehend the skills of curve fitting. 5. * Attain a range of cognitive and technical skills to integrate various functions. Have technical and practical skills required for selecting and using suitable methods for data representation and measure 			
Credits	Theory	Practical	Total	
	1	1	2	
Contact Hours	1	2	3	
Max. Marks:50(30(T)+20(P))Time: 3 Hrs.(T), 3Hrs.(P)Internal Assessment Marks:15(10(T)+5(P))Time: 3 Hrs.(T), 3Hrs.(P)End Term Exam Marks:35(20(T)+15(P))Time: 3 Hrs.(T), 3Hrs.(P)				
Part B-Contents of the Course				

Instructions for Paper-Setter			
Unit	Topics	Contact Hours	
Ι	Integration of simple algebraic, trigonometric, and exponential	4	
	Tunctions.		
	frequency distribution, Diagrammatic and graphical presentation		
	of data, Construction of bar, Pie diagrams, Histograms,		
	Frequency polygon, Frequency curve, and Ogives.		
II	Measures of central tendency : Arithmetic mean, Median, Mode, Geometric mean, and Harmonic mean for ungrouped and grouped data.	4	
	Measures of dispersion : Concept of dispersion, Mean deviation and its coefficient, Range, Variance and its coefficient, Standard deviation.		
III	Correlation: Concept and types of correlation, Methods of	4	
	finding correlation: Scatter diagram, Karl Pearson's coefficients of correlation, Rank correlation.		
IV	Linear regression : Principle of least square, Fitting of a straight line, Two lines of regression, Regression coefficients.	4	
V*	Practicum: Students are advised to do laboratory/practical	25	
	practice not limited to, but including the following types of		
	Problem Solving- Questions related to the practical problems		
	based on the following topics will be worked out and a record		
	of those will be maintained in the Practical Note Book:		
	• Demonstrate skills in finding integration of simple		
	functions.		
	 Representation of data using Bar and pie diagrams. Representation of data using Histogram Frequency. 		
	polygon, Frequency curves, and Ogives.		
	 Problems to compute measures of central tendency. 		
	• Problems to calculate measures of dispersion.		
	• Problem to calculate Karl Pearson's coefficient of		
	 Correlation. Problem to fit the straight line for the given data 		
	 Problem to find lines of regression. 		
Suggested Evaluation Methods			
Inter	nal Assessment:	End Term	
r ⊲	heory Class Participation: 4	Examination:	
 Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc : NA 		for both theory and	
•	Mid-Term Exam: 6	practicum.	
⊳ P •	racticum Class Participation: NA	End Term Exam Marks:35(20(T)+15	
•	Seminar/Demonstration/Viva-voce/Lab records etc.: 5 Mid-Term Exam: NA	(<i>r</i>))	

Part C-Learning Resources

Text / Reference Books:

- S.C. Gupta and V.K. Kapoor (2014). Fundamentals of Mathematical Statistics, S. Chand & Sons, Delhi.
- R.V. Hogg, J. W. McKean and A. T. Craig (2013). Introduction to Mathematical Statistics (7 th edition), Pearson Education.
- J. V. Dyke, J. Rogers and H. Adams (2011). Fundamentals of Mathematics, Cengage Learning.
- A.S. Tussy, R. D. Gustafson and D. Koenig (2010). Basic Mathematics for College Students. Brooks Cole.
- G. Klambauer (1986). Aspects of calculus. Springer-Verlag.

Session: 2023-24				
Part A - Introduction				
Subject	BCA			
Semester	III			
Name of the Course	Java OOP Foundati	ions		
Course Code	B23-CAP-301 (Con 301, B23-CT	B23-CAP-301 (Common with B23-CAI-301, B23-CDS- 301, B23-CTS-301)		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	СС			
Level of the course (As per Annexure-I	100-199			
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. Implement simple java programs. 2. Implement multiple inheritance using Interfaces 3. Implement Exception Handling and File Handling. 4. Use AWT to design GUI applications. 			
Credits	Theory	Practical	Total	
	3	1	4	
Contact Hours	3	2	5	
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(2 End Term Exam Marks: 70(50(T	Max. Marks:100(70(T)+30(P))Time: 3 Hrs.(T), 3Hrs.(P)Internal Assessment Marks:30(20(T)+10(P))Time: 3 Hrs.(T), 3Hrs.(P)End Term Exam Marks: 70(50(T)+20(P))Time: 3 Hrs.(T), 3Hrs.(P)			
Part B- Contents of the Course				

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours		
Ι	Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs.	10		
Π	Interfaces: Interface basics; Defining, implementing and extending interfaces; Implementing multiple inheritance using interfaces Packages: Basics of packages, Creating and accessing packages, System packages, Creating user defined packages	10		
III	Exception handling using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions. File Handling Byte Stream, Character Stream, File I/O Basics, File Operations	10		
IV	AWT and Event Handling: The AWT class hierarchy, Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Creating GUI applications using AWT.	10		
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: WAP to find the sum of 10 numbers, entered as command line arguments. WAP to find the area of rectangle and circle using Interface. WAP to implement multiple inheritance. WAP to show the concept of packages. WAP to handle the Exception using try and multiple catch blocks and a finally block. WAP for Implementing Calculator in an Applet, use appropriate Layout Manager. Write Applet code to add two integers in textbox and their sum should appear in third textbox. Write AWT program in Java to find the sum, Multiplication and average of three numbers entered in three Text fields by clicking the corresponding Labeled Button. The result should be appearing in fourth text field. Write Applet code to show all the activities of Mouse using Mouselistener and MouseMotionlistener. What are various stream classes in Java? Write Java code to read character from a file and write into another file. What are AWT Classes? Write Java Program to generate Even numbers and Odd Numbers in TextField "T1 and T2 respectively" while pressing Button "Even" and "Odd". 	25		
	Suggested Evaluation Methods			

Internal Assessment: > Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 > Practicum • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	End Term Examination: A three hour exam for both theory and practicum.			
Part C-Learning Resources				
 Recommended Books/e-resources/LMS: Schildt, H. (2018). Java: The Complete Reference. 10th edition. McGraw-Hill Education. Balaguruswamy E. (2014). Programming with JAVA: A Primer. 5th edition. India: McGraw Hill Education Horstmann, C. S. (2017). Core Java - Vol. I – Fundamentals (Vol. 10). Pearson Education Schildt, H., & Skrien, D. (2012). Java Fundamentals - A Comprehensive Introduction. India: McGraw Hill Education. 				

Session: 2023-24				
Part A - Introduction				
Subject	BCA			
Semester	III			
Name of the Course	Linux and Shell Programming			
Course Code	B23-CAP-302 (Common with B23-CAI-302, B23-CDS- 302, B23-CTS-302)			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC			
Level of the course (As per Annexure-I	100-199			
Pre-requisite for the course (if any)	Must have basic knowledge of computer			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to:1. understand Linux architecture.2 use various Linux commands that are used to manipulate system operations.3 acquire knowledge of Linux File System.4 understand and make effective use of I/O and shell scripting language to solve problems.5*. to implement the programs based on various shell			
Cradita	Theory	Proctice1	X. Total	
	3	1	4	
Contact Hours	3	2	5	
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)		
Part B- Contents of the Course				
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory				

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours		
Ι	Introduction to Linux: Linux distributions, Overview of Linux operating system, Linux architecture, Features of Linux, Accessing Linux system, Starting and shutting down system, Logging in and Logging out, Comparison of Linux with other operating systems.	10		
П	Commands in Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands, etc. Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, grep; Introducing regular expressions.	10		
III	Linux file system: Linux files, inodes and structure and file system, file system components, standard file system, file system types. Processes in Linux: Starting and Stopping Processes, Initialization Processes, Mechanism of process creation, Job control in linux using at, batch, cron & time.	10		
IV	Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating & executing shell scripts in linux.	10		
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Basic Linux command Basic Shell Programming (Fibonacci Series generation, Factorial of a given number, Checking for Armstrong number) Designing an Arithmetic calculator Generation of Multiplication table Base Conversion (Decimal to Binary, Binary to Decimal) Finding the information about the Login name and File name. Write a shell script to exchange the contents of two variables. Write a shell script, which accepts three subject marks scored by a student and declare the result. Write a shell script program to find area of a square, rectangle, circle and triangle. 	25		
Suggested Evaluation Methods				
Intern > T • • • •	End Term Examination: A three hour exam for both theory and practicum.			

- Class Participation: 5
- Seminar/Demonstration/Viva-voce/Lab records etc.: 5
- Mid-Term Exam: NA

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Yashwant Kanetkar, Unix & amp; Shell programming BPB Publications.
- Richard Petersen, The Complete Reference Linux, McGraw-Hill.
- M.G.Venkateshmurthy, Introduction to Unix & amp; Shell Programming, Pearson Education.
- Stephen Prata, Advanced UNIX-A Programmer's Guide, SAMS Publication.
- Sumitabha Das, Your Unix The Ultimate Guide, Tata McGraw-Hill.

Session: 2023-24					
Part A - Introduction					
Subjec	ct	BCA			
Semes	ster	III			
Name	of the Course	Data Base Technologies			
Cours	e Code	B23-CAP-303 (Common with B23-CAI-303, B23-CDS- 303, B23-CTS-303)			
Cours (CC/M M/DSI VAC)	e Type: ICC/MDC/CC- EC/VOC/DSE/PC/AEC/	СС			
Level of Annex	of the course (As per ure-I	100-199			
Pre-rec any)	quisite for the course (if	Basic Knowledge of computer			
Course Learning Outcomes(CLO):		 After completing this course, the learner will be able to: 1. understand the concepts of problem solving on computer 2. understand the basics of C programming along with various I/O functions 3. understand various operators and branching statements in C 4. understand loops, functions and arrays in C 			
		5*. to design programs based on theoretical concepts of C.			
Credits		Theory	Practical	Total	
		3	1	4	
Conta	et Hours	3	2	5	
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(2 End Term Exam Marks: 70(50(7)		20(T)+10(P)) Γ)+20(P))	Time: 3 Hrs.(T), 3Hrs.(P)		
	Part	B- Contents of the	Course		
Instructions for Paper- Setter					
Unit	Topics		Contact Hours		
Ι	Basic Concepts – Data, In and Instance etc. Limita	formation, Records, ations of File Bas	Files, Schema sed Approach,	10	

	Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc. Database System Architecture – 1-Tier, 2-Tier & Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances, Data Independence – Logical and Physical Data Independence.			
II	Data Models: Hierarchical, Network and Relational Data Models. Entity-Relationship Model: Entity, Entity Sets, Entity Type, Attributes: Type of Attributes, Keys, Integrity Constraints, Designing of ER Diagram, Symbolic Notations for Designing ER Diagram,	10		
III	 SQL: Meaning, Purpose and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries, Views, Specifying Indexes. Constraints and its Implementation in SQL. Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product etc. Relational Calculus: Tuple Relational and Domain Relational Calculus. Relational Algebra Vs. Relational Calculus. 	10		
IV	Relational Model: Functional Dependency, Characteristics, Inference Rules for Functional Dependency, Types of Functional Dependency, Normalization: Benefits and Need of Normalization, Normal Forms Based on Primary Keys- (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, Domain Key Normal Form.	10		
V*	 The following activities be carried out/ discussed in the lab during the period of the semester. Programming Lab: Performing various SQL statement. Creating various tables and performing all possible queries based on syllabus. Understanding relational model concepts Understanding normalization Understanding various concepts of databases. 	25		
	Suggested Evaluation Methods			
Inter >] •	nal Assessment: Theory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 Mid-Term Exam: 10	End Term Examination: A three hour exam for both theory and practicum.		

➢ Practicum

- Class Participation: 5
- Seminar/Demonstration/Viva-voce/Lab records etc.: 5
- Mid-Term Exam: NA

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Elmasri & amp; Navathe, Fundamentals of Database Systems, Pearson Education.
- A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, McGraw-Hill.
- Thomas Connolly Carolyn Begg, Database Systems, Pearson Education.
- C. J. Date, An Introduction to Database Systems, Addison Wesley.

BACHELOR OF COMPUTER APPLICATIONS SCHEME OF EXAMINATION - THIRD YEAR(w.e.f 2015-16)

A

Paper No.	Title of Paper	External Marks	Internal Assessment	Maximum Marks	Pass Marks	Exam Duration
	Semester - V					
BCA-351	Web Designing Fundamentals	80	20	100	35	3hrs
BCA-352	Operating System-I	80	20	100	35	3hrs
BCA-353	Artificial Intelligence	80	20	100	35	3hrs
BCA-354	Computer Networks	80	20	100	35	3hrs
BCA-355	Programming Using Visual Basic	80	20	100	35	3hrs
BCA-356	Multimedia Tools	80	20	100	35	3hrs
	Semester – VI					
BCA-361	Web Designing Using Advanced Tools	80	20	100	35	3hrs
BCA-362	Operating System-II	80	20	100	35	3hrs
BCA-363	Computer Graphics	80	20	100	35	3hrs
BCA-364	Internet Technologies	80	20	100	35	3hrs
BCA-365	Advanced Programming with Visual Basic	80	20	100	35	3hrs
BCA-366	Programming in Core Java	80	20	100	35	3hrs
BCA-371	Lab – I Based on BCA-351 & 361	100	20	100	35	3hrs
BCA 372	Lab II Based on BCA 355 & 365	100			35	3hrs
Internal asses	ssment will be based on the following criter	ia:				
(I)	Two Handwritten Assignments	:	10	marks		
	(Ist Assignment after one month & IInd	Assign	ment aft	er two	month	is)
(II)	One Class Test	:	5	marks		
	(one period duration)					
(III)	Attendance	:	5	marks		
Mark	s for Attendance will be given as under:					

1. 91% onwards : 5 Marks 2. 81% to 90% : 4 Marks

 3. 75% to 80% :
 3 Marks

 4. 70% to 75% :
 2 Marks*

 5. 65% to 70% :
 1 Mark*

* For students engaged in co-curricular activities of the colleges only/authenticated medical grounds duly approved by the concerned Principal.

NOTE: 1. Practical exam will be conducted annually in two sessions. However the workload will be distributed in both the semesters according to the relevant papers.

BCA-351: Web Designing Fundamentals

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Internet and World Wide Web; Evolution and History of World Wide Web; Basic Features; Web Browsers; Web Servers; Hypertext Transfer Protocol; URLs; Searching and Web-Casting Techniques; Search Engines and Search Tools

$\mathbf{UNIT} - \mathbf{II}$

Steps for Developing Website; Choosing the Contents; Home Page; Domain Names; Internet Service Provider; Planning and Designing Web Site; Creating a Website; Web Publishing: Hosting Site;

UNIT-III

Introduction to HTML; Hypertext and HTML; HTML Document Features;

HTML Tags; Header, Title, Body, Paragraph, Ordered/Unordered Line, Creating Links; Headers; Text Styles; Text Structuring; Text Colors and Background; Formatting Text; Page layouts; Insertion of Text, Movement of Text

UNIT – IV

Images: Types of Images, Insertion of Image, Movement of Image, Ordered and Unordered lists; Inserting Graphics; Table Handling Functions like Columns, Rows, Width, Colours; Frame Creation and Layouts; Working with Forms and Menus; Working with Buttons like Radio, Check Box;

TEXT BOOKS:

- Bayross Ivan, "Web Enabled Commercial Applications Development using HTML, Javascript, DHTML & PHP", BPB Publication, 2005
- Powell Thomas, "The Complete Reference HTML & CSS", Tat Mc-Graw Hill, 2010

REFERENCE BOOKS:

- Wendy Willard, "HTML Beginners Guide", Tata McGraw-Hill
- Deitel and Goldberg, "Internet and World Wide Web, How to Program", PHI.

External: 80 Internal: 20

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Operating System: Definition, Characteristics, Components, Functions, Examples; Types of Operating System: Single User/Multi User, Classification of Operating System: Batch, Multiprogrammed, Timesharing, Multiprocessing, Parallel, Distributed, Real Time; System Calls and System Programs: Process Control, File Manipulation, Device Manipulation, Information Maintenance, Communications

UNIT – II

Process Management: Process concept, Process states and Process Control Block; Process Scheduling: Scheduling Queues, Schedulers, Context Switch; Operation on Processes: Process Creation, Process Termination; Cooperating Processes, Introduction to Threads, Inter-process Communication; CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multilevel Feedback Queue Scheduling

UNIT – III

Deadlocks: System Model, Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery

Memory Management: Introduction, Swapping, Contiguous Allocation: Single-Partition/Multiple Partition Allocation, External/Internal Fragmentation; Paging: Basic Method, Hardware, Implementation of Page table; Segmentation: Basic Method, Hardware, Implementation of Segment Table, Advantages/Disadvantages of Paging/Segmentation

$\mathbf{UNIT} - \mathbf{IV}$

Virtual Memory: Introduction, Demand Paging, Page Replacement, Page Replacement Algorithms: FIFO, Optimal, LRU, Counting; Thrashing and its cause; File Management: File Concepts, File Attributes, File Operations, File Types, File Access/Allocation Methods, File Protection, File Recovery

TEXT BOOKS:

- Silberschatz A., Galvin P.B.,and Gagne G., "Operating System Concepts", John Wiley & Sons, Inc.,New York.
- Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.

REFERENCE BOOKS:

- Deitel, H.M., "Operating Systems", Addison- Wesley Publishing Company, New York.
 - Tanenbaum, A.S., "Operating System- Design and Implementation", Prentice Hall of India, New Delhi.

External: 80 Internal: 20
Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Artificial Intelligence : Intelligence, AI Concepts, Various definitions of AI, Knowledge, Knowledge Pyramid, People and Computers: What computers can do better that people, what people can do better than computers; Characteristics of AI Problems, Problem Representation in AI, Components of AI, AI Evolution, Application Areas of AI, History of AI, The Turing Test, The Revised Turing Test

UNIT – II

Expert System: Components of Expert System: Knowledge Base, Inference Engine, User Interface, Features of Expert System, Expert System Life Cycle, Categories of Expert System, Rule Based vs. Model Based Expert Systems, Advantages/Limitations of Expert System, Developing an Expert System: Identification, Conceptualization, Formalization, Implementation, Testing, Using an Expert System, Application Areas of Expert System

UNIT-III

AI and Search Process: Brute Force Search – Depth First/Breadth First Search, Heuristic Search: Hill Climbing, Constraint Satisfaction, Mean End Analysis, Best First Search, A* Algorithm, AO* Algorithm, Beam Search.

$\mathbf{UNIT} - \mathbf{IV}$

Natural Language Processing: Introduction, Need, Goal, Fundamental Problems in Natural Language Understanding, How People overcome Natural Language Problems, Speech Recognition: Introduction, Advantages and Approaches, Introduction to Robotics: Parts of a Robot, Controlling a Robot, Intelligent Robots, Mobile Robots

TEXT BOOKS:

- Henry C.Mishkoff, "Understanding Artifical Intelligence"
- V S Janakiraman, "Foundation of Artificial Intelligence and Expert Systems"

REFERENCE BOOKS:

• Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems"

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Data Communication and Computer Networks; Uses of Computer Networks; Types of Computer Networks and their Topologies; Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; OSI Reference Model; Networking Models: Distributed Systems, Client/Server Model, Peer-to-Peer Model, Web-Based Model and Emerging File-Sharing Model;

$\mathbf{UNIT} - \mathbf{II}$

Analog and Digital data and signals; Bandwidth and Data Rate, Capacity, Baud Rate; Transmission Impairment; Data Rate Limits; Guided Transmission Media; Wireless Transmission; Communication Satellites; Switching and Multiplexing; Modems and Modulation techniques; ADSL and Cable Modems;

UNIT - III

Data Link Layer Design issues; Error Detection and Correction; Sliding Window Protocols: One-bit, Go Back N and Selective Repeat; Media Access Control: ALOHA, Slotted ALOHA, CSMA, Collision free protocols; Introduction to LAN technologies: Ethernet, Switched Ethernet, Fast Ethernet, Gigabit Ethernet; Token Ring; Introduction to Wireless LANs and Bluetooth; VLANs

$\mathbf{UNIT} - \mathbf{IV}$

Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, Hierarchical Routing; Congestion Control; Traffic shaping; Choke packets; Load shedding; Elements of Transport Protocols; Network Security Issues: Security attacks; Encryption methods; Digital Signature; Digital Certificate

TEXT BOOKS:

- Andrew S. Tanenbaum, "Computer Networks", Pearson Education.
- Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", CENGAGE Learning.

REFERENCE BOOKS:

- Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill.
- Bhushan Trivedi, "Computer Networks", Oxford

BCA-355: Programming Using Visual Basic

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT - I

Introduction to VB: Visual & Non-Visual programming, Procedural, Object-Oriented, Object-Based and Event-Driven Programming Languages, VB as Even-Driven and Object-Based Language, VB Environment: Menu bar, Toolbar, Project explorer, Toolbox, Properties Window, Form Designer, Form Layout, Immediate window, Default Controls in Tool Box Visual Development and Event Driven programming

UNIT – II

Basics of Programming: Variables: Declaring Variables, Types of variables, Converting Variables Types, User Defined Data Types, Forcing Variable Declaration, Scope & Lifetime of Variables. Constants: Named & Intrinsic, Operators: Arithmetic, Relational & Logical operators, Input/output in VB: Various Controls for I/O, Message box, Input Box, Print statement.

UNIT – III

Decision Statements in VB - if statement, if-then-else, select-case; Looping Statements in VB: do-loop, for-next, while-wend; Exit statement, Nested Control Structure; Arrays: Declaring and using Arrays, One-dimensional, Two-dimensional and Multi-dimensional Arrays, Static and Dynamic arrays, Array of Arrays.

$\mathbf{UNIT}-\mathbf{IV}$

Procedures: General & Event Procedures, Subroutines, Functions, Calling Procedures, Arguments -Passing Mechanisms, Optional Arguments, Named Arguments, Functions Returning Custom Data Types

Simple Program Development in VB such as Sum of Numbers, Greatest among Numbers, Checking Even/Odd Number, HCF of Two Numbers, Generate Prime Numbers, Generate Fibonacci Series, Factorial of a Number, Searching, Sorting, etc.

TEXT BOOKS:

- Steven Holzner, "Visual Basic 6 Programming: Black Book", Dreamtech Press.
- Evangelos Petroutsos, "Mastering Visual Baisc 6", BPB Publications.
- Julia Case Bradley & Anita C. Millspaugh, "Programming in Visual Basic 6.0", Tata McGraw-Hill Edition

REFERENCE BOOKS:

- Michael Halvorson, "Step by Step Microsoft Visual Basic 6.0 Professional", PHI
- "Visual basic 6 Complete", BPB Publications.
- Scott Warner, "Teach Yourself Visual basic 6", Tata McGraw-Hill Edition
- Brian Siler and Jeff Spotts, "Using Visual Basic 6", Special Edition, PHI.

BCA-356: Multimedia Tools

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Multimedia: Basic Concept, Definition, Components & Applications of Multimedia; Hypermedia and Multimedia; Multimedia Hardware and Software; Multimedia Software Tools; Presentation Tools; Multimedia Authoring: Introduction, Features, Types of Authoring Tools: Card or Page-Based, Icon-Based, Time-Based, Object-Oriented; VRML: History, Features

UNIT – II

Images: Graphics/Image Data Types, File Formats; Color Models in Images and Video; Video: Introduction, Types of Video Signals; Analog and Digital Video; Analog Video Standards: NTSC, PAL, SECA; Digital Video Standards: Chroma Subsampling, CCIR Standards, HDTV

UNIT – III

Digital Audio: Basic Concepts, Analog vs. Digital Audio, Digitization of Sound; Digital Audio File Formats, MIDI

Quantization and Transmission of Audio: Coding of Audio; Pulse Code Modulation; Differential Coding of Audio; Lossless Predictive Coding; DPCM; DM; ADPCM

$\mathbf{UNIT} - \mathbf{IV}$

Compression Techniques: Introduction, Types of Data Compression, Run-Length Coding, Variable-Length Coding, Dictionary-Based Coding, Transform Coding

Image and Video Compression Techniques: JPEG Standard for Image Compression; JPEG Mode, Video Compression Techniques: H.261, H.263, MPEG

TEXT BOOKS:

- Ze-Nian Li, Mark S. Drew, "Fundamentals of Multimedia", Pearson Education.
- Tay Vaughan, "Multimedia Making It Work", Tata McGraw-Hill.

REFERENCE BOOKS:

- Ramesh Bangia, "Multimedia and Web Technology", Firewall Media.
- John F. Koegel Buford, "Multimedia Systems", Addison Wesley, Pearson Education.
- Ana Weston Solomon, "Introduction to Multimedia", Tata McGraw-Hill.

BCA-361: Web Designing Using Advanced Tools

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Interactivity Tool - JavaScript: Introduction, Features, Data types, Operators, Statements, Functions, Event Handling, Use of Predefined Object and Methods, Frames, Windows, Tables, Images, Links Interactivity Tool - VBScript: Introduction, Features, Variables, Data Types, Numeric and Literal Constants, Arrays, Operators, Subroutine Procedures, Function Procedures, Control Statements, Strings, Message and Input Boxes, Date and Time, Event Handlers, Embedding VBScript in HTML

$\mathbf{UNIT} - \mathbf{II}$

Interactivity Tool - Active Script Pages – Introduction, Features, Client-Server Model, Data Types, Decision Making Statements, Control statements, Use of Various Objects of ASP, Various Techniques of Connecting to Database

Other Interactivity Tools - Macromedia Flash, Macromedia Dreamweaver, PHP: Basic Introduction and Features

UNIT – III

DHTML: Introduction, Features, Events, Dynamic Positioning, Layer Object, Properties of STYLE, Dynamic Styles, Inline Styles, Event Handlers; Cascading Style Sheets (CSS): Basic Concepts, Properties, Creating Style Sheets; Common Tasks with CSS: Text, Fonts, Margins, Links, Tables, Colors; Marquee; Mouseovers; Filters and Transitions; Adding Links; Adding Tables; Adding Forms; Adding Image and Sound; Use of CSS in HTML Documents Linking and Embedding of CSS in HTML Document

UNIT – IV

Microsoft FrontPage: Introduction, Features, Title Bar, Menu bar, FrontPage Tool Bar, Style, FontFace and Formatting Bar, Scroll Bars

XML: Introduction, Features, XML Support and Usage, Structure of XML Documents, Structures in XML, Creating Document Type Declarations, Flow Objects, Working with Text and Font, Color and Background Properties;

TEXT BOOKS:

- Jon Duckett, "Beginning web programming with HTML, XHTML, CSS and JavaScript" Wiley India Pvt. Ltd.
- Paul Wilton, "Beginning JavaScript" Wiley India Pvt. Ltd.
- Mitchell and Atikinson, "Active Sever Pages" Techmedia Publishing
- Adrian Kingsley, "VB Script Programming Reference" Wiley India Pvt. Ltd.

REFERENCE BOOKS:

- Thomas A. Powell, "Web Design: The Complete Reference", 4/e, /Tata McGraw-Hill
- Deitel and Goldberg, "Internet and World Wide Web", How to Program, PHI.
- Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.
- Ramesh Bangia, "Multimedia and Web Technology", Firewall Media.
- Internet and Web Design, ITLESL Research and Development Wing, Macmillan India.

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Process Synchronization: The Critical Section Problem – Single Process/Two Process Solutions; Semaphores – Types, Implementation, Deadlocks and Starvation; Classical Problems of Synchronization – The Bounded Buffer Problem, The Readers and Writers Problem, The Dining-Philosophers Problem, Critical Regions, Monitors

Directory Structure: Single Level, Two Level, Tree Structures, Acyclic Graph, General Graph; Directory Implementation, Recovery

UNIT – II

Secondary Storage Structure: Disk Structure, Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK; Selection of Disk Scheduling Algorithm; Disk Management; Swap Space Management Network Operating Systems: Remote Login, Remote File Transfer; Distributed Operating System: Data Migration, Computation Migration, Process Migration

UNIT – III

Linux: Introduction, Features, Architecture, Distributions, Accessing Linux System, Login/Logout/Shutting Down, Comparison of Linux with other Operating Systems, Commands in Linux: General-Purpose Commands, File Oriented Commands, Directory Oriented Commands, Communication Oriented Commands, Process Oriented Commands, Redirection of Input and Output, Pipes

$\mathbf{UNIT}-\mathbf{IV}$

Linux File System: Types of Files in Linux, File Attributes, Structure of File System, inode, File Permission, File System Components, Standard File System, File System Types, Disk Related Commands

Processes in Linux: Introduction, Job Control in Linux using at, batch, corn & time commands The vi editor: Introduction, Modes of vi Editor, Command in vi Editor

Shell Programming: Introduction, Shell Variables, Shell Keywords, Operators, Assigning Values to the Variables, I/O in Shell, Control Structures, Creating & Executing Shell Programs in Linux.

TEXT BOOKS:

- Silberschatz A., Galvin P.B., and Gagne G., "Operating System Concepts", John Wiley & Sons, Inc., New York.
- Godbole, A.S., "Operating Systems", Tata McGraw-Hill Publishing Company, New Delhi.
- Richard Petersen, The Complete Reference Linux, McGraw-Hill.
- Yashwant Kanetkar, UNIX & Shell programming BPB.

REFERENCE BOOKS:

- Deitel, H.M., "Operating Systems", Addison- Wesley Publishing Company, New York.
- Tanenbaum, A.S., "Operating System- Design and Implementation", Prentice Hall of India, New Delhi.
- Sumitabha Das, Your UNIX The Ultimate Guide, Tata McGraw-Hill.

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Introduction to Computer Graphics; Interactive and Passive Graphics; Applications of Computer Graphics; Display Devices: CRT; Random Scan, Raster Scan, Refresh Rate and Interlacing, Bit Planes, Color Depth, Color Palette, Color CRT Monitor, DVST, Flat-Panel Displays: Plasma Panel, LED, LCD; Lookup Table, Interactive Input Devices, Display Processor, General Purpose Graphics Software, Coordinate Representations;

$\mathbf{UNIT}-\mathbf{II}$

Point-Plotting Techniques: Scan Conversion, Scan-Converting a Straight Line: The Symmetrical DDA, The Simple DDA, Bresenham's Line Algorithm; Scan-Converting a Circle: Circle drawing using Polar Coordinates, Bresenham's Circle Algorithm, Scan-Converting an Ellipse: Polynomial Method, Trigonometric Method; Polygon Area Filling: Scan-line Fill and Flood Fill Algorithms;

UNIT – III

Two-Dimensional Graphics Transformation: Basic Transformations: Translation, Rotation, Scaling; Matrix Representations and Homogeneous Coordinates; Other Transformations: Reflection, Shearing; Coordinate Transformations; Composite Transformations; Inverse Transformation; Affine Transformations; Raster Transformation;

Graphical Input: Pointing and Positioning Devices and Techniques

$\mathbf{UNIT} - \mathbf{IV}$

Two-Dimensional Viewing: Window and Viewport, 2-D Viewing Transformation

Clipping: Point Clipping; Line Clipping: Cohen-Sutherland Line Clipping Algorithm, Mid-Point Subdivision Line Clipping Algorithm; Polygon Clipping: Sutherland-Hodgman Polygon Clipping Algorithm;

Three-Dimensional Graphics: Three-Dimensional Display Methods; 3-D Transformations: Translation, Rotation, Scaling; Composite Transformations;

TEXT BOOKS:

- Donald Hearn, M. Pauline Baker, "Computer Graphics", PHI.
- Apurva A. Desai, "Computer Graphics", PHI, 2010

REFERENCE BOOKS:

- Newmann & Sproull, "Principles of Interactive Computer Graphics", McGraw Hill.
- Foley, "Computer Graphics Principles & Practice", Addison Wesley.
- Rogers, "Procedural Elements of Computer Graphics", McGraw Hill.
- Zhigang Xiang, Roy Plastock, "Computer Graphics", Tata McGraw Hill.
- D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.

BCA-364: Internet Technologies

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT - I

Internet: Introduction; History; Internet Services; TCP/IP: Architecture, Layers, Protocols; TCP/IP model versus OSI Model; World Wide Web (WWW) - The Client Side, The Server Side, Creating and Searching Information on the Web, Popular Search Engines, URL, HTTP, Web Browsers, Chat & Bulletin Board, USENET & NNTP (Network News Transfer Protocol); Internet vs. Intranet;

$\mathbf{UNIT} - \mathbf{II}$

TCP, UDP and IP Protocols, Port Numbers; Format of TCP, UDP and IP; IPv4 addressing; The need for IPv6; IPv6 addressing and packet format; TCP Services; TCP Connection Management; Remote Procedure Call; IP Address Resolution- DNS; Domain Name Space; DNS Mapping; Recursive and Iterative Resolution; Mapping Internet Addresses to Physical Addresses: ARP, RARP, DHCP; ICMP; IGMP;

UNIT – III

Application Layer: Electronic Mail: Architecture; Protocols - SMTP, MIME, POP, IMAP; Web Based Mail; File Access and Transfer: FTP, Anonymous FTP, TFTP, NFS; Remote Login using TELNET; Voice and Video over IP: RTP, RTCP, IP Telephony and Signaling, RSVP;

$\mathbf{UNIT} - \mathbf{IV}$

Routing in Internet: RIP, OSPF, BGP; Internet Multicasting; Mobile IP; Private Network Interconnection: Network Address Translation (NAT), Virtual Private Network (VPN); Internet Management and SNMP; Internet Security: E-Mail Security; Web Security; Firewall; Introduction to IPSec and SSL;

TEXT BOOKS

- Douglas E. Comer, "Internetworking with TCP/IP Volume I, Principles, Protocols, and Architectures", Fourth Edition, Pearson Education.
- Andrew S. Tanenbaum, "Computer Networks", Pearson Education.

REFERENCE BOOKS:

- Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill.
- Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", CENGAGE Learning.
- James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Pearson Education.
- "Introduction to Data Communications and Networking", Wayne Tomasi, Pearson Education.

BCA-365: Advanced Programming with Visual Basic

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Collections: Adding, Removing, Counting, Returning Items in a Collection, Processing a Collection; Working with Forms: Form Properties, Creating, Adding, Removing Forms in Project, Adding Multiple Forms, Managing Forms at Run Time, Hiding & Showing Forms, Load & Unload Statements, Drag and Drop Operation, Activate & Deactivate events, Form-load event, Example using Forms, Programs in VB using Forms

$\mathbf{UNIT} - \mathbf{II}$

Working with Menu: Menu Designing in VB, Adding a Menu to a Form, Modifying and Deleting Menu Items, Adding Access Characters, Adding Shortcut Keys, Manipulating Menus using Common Dialog Box, Attaching Code to Events, Creating Submenus, Dynamic Menu Appearance

Advanced Controls in VB: Scroll Bar, Slider Control, Tree View, List View, Rich Text Box Control, Toolbar, Status Bar, Progress Bar, Cool bar, Image List

Program Development in VB using Menus and Advance Controls

UNIT – III

File Handling & File Controls: Sequential & Random files, Opening and Closing Data Files, Viewing the Data in a File, Performing Operations on a File, Creating a Sequential Data File, Writing Data to a Sequential File, Reading the Data in a Sequential File, Finding the End of a Data File, Locating a File, Reading and Writing a Random File (get, put, LOF, seek).

Working with Graphics: Using Paint, Line, Circle, Manipulating Graphics

Program Development in VB using Files and Graphics

$\mathbf{UNIT} - \mathbf{IV}$

Accessing Databases: Data Controls, Data-Bound Controls, DAO, RDO, ADO, Creating the Database, Setting Properties, Applying Operations on Database, Viewing the Database, Updating the Database (adding, deleting records)

Program Development in VB using Database and Advance Controls

TEXT BOOKS:

- Steven Holzner, "Visual Basic 6 Programming: Black Book", Dreamtech Press.
- Evangelos Petroutsos. "Mastering Visual Baisc 6", BPB Publications.
- Julia Case Bradley & Anita C. Millspaugh, "Programming in Visual Basic 6.0", Tata McGraw-Hill Edition

REFERENCE BOOKS:

- Michael Halvorson, "Step by Step Microsoft Visual Basic 6.0 Professional", PHI
- "Visual basic 6 Complete", BPB Publications.
- Scott Warner, "Teach Yourself Visual basic 6", Tata McGraw-Hill Edition
- Brian Siler and Jeff Spotts, "Using Visual Basic 6", Special Edition, PHI.

BCA-366: Programming in Core Java

Maximum Marks: 100 Minimum Pass Marks: 35 Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT – I

Basic Principles of Object Oriented Programming, Introduction to Java, History and Features of Java, Java Virtual Machine (JVM), Java's Magic Bytecode; The Java Runtime Environment; Basic Language Elements: Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data types, Operators, Assignments; Input/output in Java: Basics, I/O Classes, Reading Console Input, Control Structures in Java: Decision and Loop Control Statements

UNIT – II

Class and Object in Java: Defining Class in Java, Creating Objects of a Class, Defining Methods, Argument Passing Mechanism, Using Class and Objects, Constructors, Nested Class, Inner Class, Abstract Class, Dealing with Static Members; Array & String in Java: Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Defining String, Operation on Array and String, Creating Strings using String Class, Creating Strings using String Class, Polymorphism in Java: Basic Concept, Types, Overriding vs. Overloading, Implementation

UNIT – III

Extending Classes and Inheritance in Java: Benefits of Inheritance, Types of Inheritance in Java, Access Attributes, Inheriting Data Members and Methods, Role of Constructors in Inheritance, Use of "super"; Packages & Interfaces: Basic Concepts of Package and Interface, Organizing Classes and Interfaces in Packages, Defining Package, Adding Classes from a Package to Your Program, CLASSPATH Setting for Packages, Import Package, Naming Convention For Packages, Access Protection in Packages, Standard Packages

UNIT – IV

Exception Handling in Java: The Idea behind Exception, Types of Exception, Use of try, catch, finally, throw, throws in Exception Handling, In-built and User Defined Exceptions, Checked and Un-Checked Exceptions, Catching more than one Exception; Applet in Java: Applet Basics, Applet Architecture, Applet Life Cycle, Applet Tag, Parameters to Applet, Embedding Applets in Web page, Creating Simple Applets; GUI Programming: Designing Graphical User Interfaces in Java, Components and Containers, Using Containers, Layout Managers, AWT Components, AWT Classes, AWT Controls,

TEXT BOOKS:

- Patrick Naughton and Herbert Schlitz, "JAVA-2 Complete Reference", TMH, New Delhi.
- Ivor Horton, "Beginning JAVA 2", WROX Publications, New Delhi.

REFERENCE BOOKS:

- "JAVA 2 UNLEASHED", Tech Media Publications, New Delhi.
- E Balaguruswamy, "Programming with Java", TMH, New Delhi.

Kurukshetra University, Kurukshetra (Established by the State Legislature Act XII of 1956) ('A+' Grade, NAAC Accredited)

॥ योगस्थ: कुरु कर्माणि ॥ समबुद्धि व योग युक्त होकर कर्म करो (Perform Actions while Stead fasting in the State of Yoga)



Scheme of Examination for Under-Graduate Programmes Skill Enhancement Courses (SEC) Offered by Department of Computer Science & Applications According to Curriculum Framework for Under-Graduate Programmes As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based Credit System) DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS (For the Batches Admitted from 2023-2024)

Kurukshetra University Kurukshetra Scheme of Examination for Undergraduate Programmes Skill Enhancement Courses (Computer Science) According to Curriculum Framework for Undergraduate Programmes

as per NEP 2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

Sem	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs) T + P
Ι	SEC	B23- SEC-101	Office and Spreadsheet Tools Learning	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
	SEC	B23- SEC-102	Advance Spreadsheet Tools	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
	SEC	B23-	Basic IT Tools	2	2	15	35	50	3
		SEC-103	Practical	1	2	5	20	25	3
	SEC	B23-	Essentials of Python	2	2	15	35	50	3
	SEC-IU	SEC-104	Practical	1	2	5	20	25	3
	SEC B23 SEC	B23- SEC-105	Introductory Course in R	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
	SEC B23- SEC-106	B23- SEC-106	Computer Programming in C	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
Π	SEC	B23- SEC-201	Cloud Computing Skills	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
III	SEC	SEC B23-	Advance IT Skills	2	2	15	35	50	3
		SEC-301	Practical	1	2	5	20	25	3
	SEC	B23-	Data Management	2	2	15	35	50	3
		SEC-302	Practical	1	2	5	20	25	3

Kurukshetra University, Kurukshetra (Established by the State Legislature Act XII of 1956) ('A+' Grade, NAAC Accredited)

॥ योगस्थ: कुरु कर्माणि ॥ समबुद्धि व योग युक्त होकर कर्म करो (Perform Actions while Stead fasting in the State of Yoga)



Syllabus of Examination for Under-Graduate Programmes SKILL ENHANCEMENT COURSES (SEC) according to Curriculum Framework for Under-Graduate Programmes As per NEP-2020 (Multiple Entry-Exit, Internships and Choice BasedCredit System) DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS (For the Batches Admitted From 2023-2024)

Session: 2023-24				
Part A - Introduction				
Subject	COMPUTER SCIE	COMPUTER SCIENCE		
Semester	Ι			
Name of the Course	Office and spreadsh	neet Tools Learning		
Course Code	B23-SEC-101			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC			
Level of the course (As per An- nexure-I				
Pre-requisite for the course (if any)	f			
Course Learning Outcomes(CLO):	urse Learning Outcomes(CLO): After completing this course, the learner will be able to 1. understand the basic concepts of operating system 2. do the basic editing and formatting in a document 3. create basic spread-sheets for different purposes 4. create basic presentations for different application		r will be able to: berating systems in a document cent purposes eent applications	
	5*. to understand the working of operating system and various office tools practically.			
Credits	Theory	Practical	Total	
	2	1	3	
Contact Hours	2	2	4	
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks: 55(35(T)+20(P))Time: 3 Hrs.(T), 3Hrs.(P)		3Hrs.(P)		
Part B-Contents of the Course				

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours		
Ι	Operating System - Definition, Functions, Types of Operating System, Basics of Popular Operating Systems, The User Interface, Exploring Computer, Icons, taskbar, desktop, Using Menu and Menuselection, managing files and folders, Control panel – display properties, add/remove software and hardware, Common utilities.	4		
Π	Word Processing - Introduction to Word Processing, Menus, Creating, Editing & Formatting Document, Spell Checking, Printing, Views, Tables, Word Art, Mail Merge, Macros, Inserting hyperlinks, Searching for text, Modifying page setup, Applying document themes, Applying document style sets, Inserting headers and footers.	7		
III	Spread Sheet: Elements of Electronics Spread Sheet, Applications, Creating and Opening of Spread Sheet, Menus, Manipulation of cells: Enter texts numbers and dates, Cell Height and Widths, Copying of cells, Mathematical, Statistical and Financial function, Drawing different types of charts, Sort and Filter Data.	7		
IV	Presentation Software: Creating, Modifying and enhancing a presentation, Type of presentation views, Using sound, Animation, Working with Objects, Printing.	7		
V*	 Practicum: Operating System: Starting with basics of Operating Systems and its functionalities Word Processing: Create and format word documents. Use tables, word Art and other features in your documents. Use macros to simplify the tasks in a document. Use mail merge to write once for many. Spread Sheet: Use spreadsheet for basic data handling Apply formulas to sheet for automation. Use Charts & Shapes for better visualization of the data. Use sorting and filtering of the data Presentation Software: Prepare and format presentations. Apply different formatting and insert options to make presentation better. Appling sound and animation. 	25		
	Suggested Evaluation Methods			
Intern > T •	nal Assessment: heory Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.: 4 Mid-Term Exam: 7	End Term Ex- amination: A three hour exam for both theory and		

> Practicum	practicum.
Class Participation: 2	
• Seminar/Demonstration/Viva-voce/Lab records etc.: 3	
Mid-Term Exam: NA	
Part C-Learning Resources	
Recommended Books/e-resources/LMS:	
 Recommended Books/e-resources/LMS: Help files from Apache Open Office, https://wiki.openoffice.org/wiki/Documentation Channelle Andy, "Beginning OpenOffice 3: From Novice to Professional", aPress Publications Beginning OpenOffice 3: From Novice to Professional, Andichannele, Apress. Microsoft Office 2016 Step by Step: MS Office 2016 Step by Step, By Joan Lambert, Curtis Frye Computer Fundamentals - By Pradeep K. Sinha, Priti Sinha, BPB Publications, 6th Edition Getting Started with LibreOffice 5.0, Friends of OpenDocuments Inc., Http://friendsofopendocument.com 	

Session: 2023-24				
Part A - Introduction				
Subject	COMPUTER SCI	COMPUTER SCIENCE		
Semester	Ι			
Name of the Course	Advance Spreadsh	leet Tools		
Course Code	B23-SEC-102			
CourseType: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC			
Level of the course (As per Annex- ure-I				
Pre-requisite for the course (if any)	ourse (if			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. create and format spreadsheets 2. create and format tables and applying formulas in a spreadsheet 3. create charts and protect worksheets 4. create and use pivot charts and tables 			
Credits	Theory	Practical	Total	
	2	1	3	
Contact Hours	2	2	4	
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(End Term Exam Marks:55(35(T)+	(T)+5(P)) -20(P))	Time: 3 Hrs.(T),	3Hrs.(P)	
Part B-Contents of the Course				
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory.				

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of threehour duration.

Unit	Topics	Contact Hours	
Ι	Manage Workbook Options and Settings: Create Worksheets and Workbooks, navigate in Worksheets and Workbooks, Format Worksheets and Workbooks, Customize Options and Views for Worksheets and Workbooks, Configure Worksheets and Workbooks for Distribution Apply Custom Data Formats and Layouts: Apply Custom Data Formats and Validation, Apply Advanced Conditional Formatting and Filtering, Create and Modify Custom Workbook Elements	6	
Π	Create Tables: Create and Manage Tables, Manage Table Styles and Options, Filter and Sort a Table Perform Operations with Formulas and Functions: Summarize Data by using Functions, Perform Conditional Operations by using Functions, Format and Modify Text by using Functions.	6	
III	Create Charts and Objects: Create Charts, Format Charts, Insert and Format Objects Manage Workbook Options and Settings: Manage Workbooks, Manage Workbook Review Restrict editing	6	
IV	Create Advanced Formulas: Apply Functions in Formulas, Look up data by using Functions, Apply Advanced Date and Time Functions, Perform Data Analysis and Business Intelligence, Define Named Ranges and Objects, Create Advanced Charts and Tables: Create and Manage PivotTables, Create and Manage Pivot Charts	6	
V*	 Practicum: Spread Sheet: Use spreadsheet for basic data handling Apply formulas to sheet for automation. Use if-else to make certain decisions in a sheet. Use Charts & Shapes for better visualization of data. Use filters and data validation controls for control of data Formatting data and spreadsheets Creating and managing tables Use Pivot table and charts Use what-if analysis along with goal seek and scenarios 	25	
Suggested Evaluation Methods			
Interr > T • • • • • •	hal Assessment: heory Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.:4 Mid-Term Exam: 7 racticum Class Participation: 2	End Term Ex- amination: A three hour ex- am for both theo- ry and practi- cum.	

- Seminar/Demonstration/Viva-voce/Lab records etc.:3
- Mid-Term Exam: NA

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Help files from Apache Open Office, https://wiki.openoffice.org/wiki/Documentation
- Channelle Andy, "Beginning OpenOffice 3: From Novice to Professional", aPress Publications
- Beginning OpenOffice 3: From Novice to Professional, Andichannele, Apress.
- Microsoft Office 2016 Step by Step: MS Office 2016 Step by Step, By Joan Lambert, Curtis Frye
- Getting Started with LibreOffice 5.0, Friends of OpenDocuments Inc., Http://friendsofopendocument.com
- Documentation from LibreOffice, https://documentation.libreoffice.org/en/english-documentation/
- Walter Holland, Microsoft Office 2013 Digital Classroom
- Wayne L. Winston, Data Analysis and Business Modeling

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCI	ENCE	
Semester	Ι		
Name of the Course	Basic IT Tools		
Course Code	B23-SEC-103		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	SEC		
Level of the course (As per Annex- ure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: Identify the basic components of computers and terminology acquaint with Operating System and its applications for both desktop and mobile devices Understand computer networks, and browse the internet, content search, email and collaborate with peers Use e-Governance applications; and use computer to improve existing skills and learn new skills 		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks:55(35(T)+20(P))		Time: 3 Hrs.(T),	3Hrs.(P)
Part B-Contents of the Course			
<u>Instructions for Paper- Setter</u> Examiner will set a total of nine questions. Out of which first question will be compulsory.			

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-

hour duration.

Unit	Topics	Contact Hours	
I	Introduction to Computer: Computer and Latest IT gadgets, Evolution of Computers & its applications, Basics of Hardware and Software, Application Software, Systems Software, Utility Software. Central Processing Unit, Input devices, Output devices, Computer Memory & storage, Mobile Apps.	6	
Π	Introduction to Operating System, Functions of the Operating system, Operating Systems for Desktop and Laptop, Operating Systems for Mobile Phone and Tablets, User Interface for Desktop and Laptop, Task Bar, Icons & shortcuts, Running an Application, Operating System Simple Setting, Changing System Date and Time, Changing Display Properties, To Add or Remove Program and Features, Adding, Removing & Sharing Printers, File and Folder Management.	6	
III	Introduction to Internet and World Wide Web, Basic of Computer Networks, Local Area Network (LAN), Wide Area Network (WAN), Network Topology, Internet, Applications of Internet, Website Address and URL, Popular Web Browsers (Internet Explorer/Edge, Chrome, Mozilla Firefox, Opera etc.), Popular Search Engines, Searching on the Internet.	6	
IV	E-mail: Using E-mails, Opening Email account, Mailbox: Inbox and Outbox, Creating and Sending a new E-mail, replying to an E-mail message, forwarding an E-mail message, searching emails, Attaching files with email, Email Signature. Social Networking: Facebook, Twitter, LinkedIn, Instagram, Instant Messaging (WhatsApp, Facebook Messenger, Telegram), Introduction to Blogs, Digital Locker.	6	
V*	 Practicum: Identify the various parts of computer Using computer/mobile software and hardware Use of operating system for various tasks such as file creation, directory creation, shortcut creation, using control panel, etc. Using Internet & various browsers. Identify the various hardware/software required for Internet How to create and use e-mail account Using Facebook, WhatsApp, Instagram, LinkedIn, Telegram Writing blogs 	25	
Suggested Evaluation Methods			
Interr > T	aal Assessment: heory	End Term Ex- amination: A three hour ex-	

 Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.:4 Mid-Term Exam: 7 	am for both theo- ry and practi- cum.			
 Practicum Class Participation: 2 Seminar/Demonstration/Viva-voce/Lab records etc.:3 Mid-Term Exam: NA 				
PartC-Learning Resources	PartC-Learning Resources			
Recommended Books/e-resources/LMS:				
 Sinna, P.K. & Sinna, Phu, Computer Fundamentals, BPB Dromey, R.G., How to Solve it By Computer, PHI 				
 Norton, Peter, Introduction to Computer, McGraw-Hill Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World 				
 Rajaraman, V., Fundamentals of Computers, PHI Ram, B., Computer Fundamentals, Architecture & Organization, New Age Internationa (P) Ltd. 				

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIE	ENCE	
Semester	Ι		
Name of the Course	Essentials of Pytho:	n	
Course Code	B23-SEC-104		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per An- nexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. Understand the basic concepts of Python 2.Learn the syntax and semantics of Python Programming Language. 3. Illustrate the process of structuring the data using lists, tuples and dictionaries. 4. Write Python functions to facilitate code reuse and manipulate strings. 5*. Understand the basic concepts of Python Programming practically. 		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks:55(35(T)+20(P))Time: 3 Hrs.(T), 3Hrs.(P)		3Hrs.(P)	
Part B-Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory			

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of

three-hour duration.				
Unit	Topics	Contact Hours		
Ι	 Keywords and Identifiers; Comments: Purpose/use of comments, Single line comment/Multiline comment; Python Variables: Declaration of Variables, Assign Values to Variables, Initializa- tion, Reading, Variable naming restrictions, and Types of Python Variables. Python Data Types: Implicit Declaration of Data Types, Python Numbers (Integers, floating-point numbers, and complex numbers), Python Strings, Python Boolean data type; 	6		
II	Operators: Arithmetic, Comparison/Relational Operators, Increment Operators, Logical operators, Identity Operators, and Operators Precedence. Python Control Flow Statement, Decision Making: Simple If Structure, if-else structure, if elif structure, and nested If Structure;	6		
III	 Looping: Python Loop Statements. Python while loop, Python for loop, Python range(), Python Nested Loop Structures, and Inserting conditions in Loops and vice versa; Python Branching Statements – break, continue, pass. Python Lists: Create Python Lists, Update Python Lists, Delete Elements from Python Lists, and Built-in Functions Methods for Python Lists. 	6		
IV	 Tuples: create, update, join and methods; Sets: create, add/remove items, join sets, set methods; Dictionary: create, access, add/remove items, dictionary methods. Manipulating Strings - Working with Strings, Useful String Methods Python Functions: defining function, arbitrary arguments, keywords arguments, default parameter values, return value and return statements; Lambda; Arrays: looping through array elements, array methods; 	7		
V*	 Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Write a program to compute distance between two points taking input from the user (Pythagorean Theorem). Write a program add.py that takes 2 numbers as command line arguments and prints its sum. Write a Program for checking whether the given number is an even number or not. Using for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4,1/10. Create a list and perform the following methods (a) insert() (b) remove() (c) append() (d) len() (e) pop() (f) clear() Create a dictionary and apply the followingmethods: (a) Print the dictionary items (b) access items 	25		

	 (c) useget() (d) change values (e) use len() Create a tuple and perform the following methods: 			
	(a) Add items (b) len() (c) check for item in tuple			
	(d) Access items			
	• write a python program to print a number is posi- tive/negative using if-else.			
	• Write a python program to find largest number among three numbers.			
	• Write a python Program to read a number and display cor-			
	 Write a program to create a menu with the following op- 			
	tions:			
	(a) TO PERFORM ADDITITON (b) TO PERFORMSUBTRACTION (c) TO PERFORM MULTIPICATION (d) TOPERFORM DIVISION			
	• Accepts users input and perform the operation according-			
	ly. Use functions with arguments.			
	• Write a python program to check whether the given string is palindrome or not.			
	• Write a python program to find factorial of a given num-			
	ber using functions			
	• Write a Python function that takes two lists and returns True if they are equal otherwise false.			
	• Demonstrate a python code to print try, except and finally			
	 Write a Python script that prints prime numbers less than 			
	20.			
	• Write a python program to find factorial of a number.			
	Suggested Evaluation Methods			
Intern	al Assessment:	End Term Exam-		
> T	heory Class Participation: A	ination: A three hour ev-		
•	Seminar/presentation/assignment/quiz/class test etc.:4	am for both theo-		
•	Mid-Term Exam: 7	ry and practicum.		
$\gg \mathbf{P}$	racticum			
•	Class Participation: 2			
•	Mid-Term Exam: NA			
	Part C-Learning Resources			
Recon	nmended Books/e-resources/LMS:	nuter Scientist" 2nd		
	 Allen B. Downey, Think Python: How to Think Like a Computer Scientist", 2n Edition, Green Tea Press, 2015, ISBN: 978-9352134755. 			
	• Charles Dierbach, "Introduction to Computer Science Using P			
	 Wesley J Chun, "Core Python Applications Programming". 3 	Brd Edition. Pearson		
	EducationIndia, 2015. ISBN-13: 978-9332555365.			

• ReemaThareja, "Python Programming using problem solving approach", Oxfor-

dUniversity press, 2017. ISBN-13: 978-0199480173 Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3",1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278

Session: 2023-24				
Part A - Introduction				
Subject	COMPUTER SCIENCE			
Semester	Ι			
Name of the Course	Introductory Course	Introductory Course in R		
Course Code	B23-SEC-105	B23-SEC-105		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC			
Level of the course (As per An- nexure-I				
Pre-requisite for the course (if any)				
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1.Describe the features of R Programming. 2. Use the various data structures in R. 3. Apply data frames, control statements and functions for the simulation. 4. Identify the statistical methods applied in R. 5*. understand the basic concepts of R Programming practically. 			
Credits	Theory	Practical	Total	
	2	1	3	
Contact Hours	2	2	4	
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks:55(35(T)+20(P))		Time: 3 Hrs.(T), 3	3Hrs.(P)	
Part B-Contents of the Course				

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
Ι	Introducing to R, Installation of Libraries; Constants and Variables; Numbers; R Data Structures, Help functions in R. Vectors: Numeric Vectors, Scalars, Declarations Vectorized operation: Using all and any, NA and NULL values, Filtering, Vectorized if-then else, Vector Equality, Vector Element names, Arithmetic and Boolean operations, conditional and loop statement in R.	6
П	Functions and Recursions in R, Packages in R; Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns: Adding and deleting rows and columns, Higher Dimensional arrays; Vector/Matrix Distinction; Avoiding Dimension Reduction; Characters and Strings; String vector; String operations and functions.	6
III	List: Creating lists, General list operations, accessing list components and values, applying functions to lists, recursive lists, Different R operations using a List, matrix, Array; Overview on Data Frames: Create it in scratch, Matrix-like operations in frames, Merging Data Frames, Applying functions to Data frames.	6
IV	Factors and Tables: factors and levels, Common functions used with factors, working with tables, Math and Simulations in R, reading a datafile directly into a dataframe, EDA using R, Reading different file formats. Input/Output: reading and writing files, String Manipulation. Statistical analysis: Basic Statistical function, Linear Model, R functions for statistical analysis	6
V*	 Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Perform arithmetic operations in R. Demonstrate the process of creating a user defined function in R. Perform logical operations in R. Implement Loops with different examples. Learn the basics of functions in R and implement with examples. Implement data frames in R. Write a program to join columns and rows in a dataframe using cbind() and rbind() in R. Implement different String Manipulation functions in R. Implement different data structures in R (Vectors, Lists, Data Frames) Write a program to read a csv file and analyze the data in the file in R Create a data set and do statistical analysis on the data using R 	25

Suggested Evaluation Methods		
Internal Assessment: > Theory Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.:4 Mid-Term Exam: 7 > Practicum Class Participation: 2 	End Term Exam- ination: A three hour exam for both theory and practicum.	
 Class Participation: 2 Seminar/Demonstration/Viva-voce/Lab records etc.:3 Mid-Term Exam: NA 		
Part C-Learning Resources		
 Recommended Books/e-resources/LMS: Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", NoStarch Press, 2011 Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data& Analytics Series, 2013. Mark Gardener, "Beginning R – The Statistical Programming Language", Wiley, 2013 Robert Knell, "Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R", Amazon Digital South Asia Services Inc, 2013. 		

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	Ι		
Name of the Course	Computer Programming in C		
Course Code	B23-SEC-106		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per An- nexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. understand the basic concepts of C Programming 2. develop programming capability to design programs as well as real life applications using C language. 3. It also cover the concept of core programming like how to implement functions, arrays and how to manage data in files using different operations. 4.Understand various header Files. 		
	5*. Understand the basic concepts of C Programming practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks:55(35(T)+20(P))		Time: 3 Hrs.(T),	3Hrs.(P)
Part B-Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory.			

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
Ι	 Introduction to C: Data Types: Primitive Data types, Derived Data types, User-Defined Data Types; Operators: Different Types of Operators, Precedence of Operators, Expression and Statements; Token: Variables, Constants, Literals, Identifiers, Keyword, Escape Sequence; Types of Conversion: Typecasting, Conversion. 	6
II	Decision Control Statements: IF, IF-ELSE, Nested IF, IF- ELSE ladder, Switch-case; Iterative statements: FOR loop, WHILE loop, DO-WHILE loop; Jump Statements: Break, Continue.	б
III	 Array: Declaration of an Array, Initialization of Array, Type of Array: Single Dimension Array, Two-Dimensional Array; Address Calculation of an Element in Array. Character Array and Strings: Reading, writing, String Handling Functions: strcat(), strcmp(), strcpy(), strlen(). 	6
IV	Functions: User-Defined Functions; Function Declaration; Types of Arguments: Actual Arguments, Formal Arguments; Function Definition; Methods to Call a Function: Call by Value, Call by Reference; Passing Arrays as Parameters. Storage classes: Automatic, Register, Static, and External Structures; Unions; Enumerations.	6
V*	 Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x The distance between two cities (in Km) is input through the keyboard. Write a C program to convert and print this distance in meter, feet, inches and centimeter. If a five-digit number is input through the keyboard, write a C program to calculate the sum of its digits without using loop. If a four-digit number is input through the keyboard, write a C program to obtain the sum of the first and last digit of this number. Program to find largest and smallest number from four given number. Program to find out the grade of a student when the marks of 5 subjects are given. A library charges a fine for every book returned late. For first 5 days the fine is 50 paise, for 6-10 days fine is one 	25

	munde and above 10 days fine is 5 mundes. If you notions the	
	have after 20 days me is 5 tupees. If you return the	
	book after 30 days your membership will be cancelled.	
	write a program to access the number of days the member	
	is late to return the book and display the fine or the appro-	
	priate message.	
	• Write a C program in which enter any number by the user	
	and perform the operation of Sum of digits of entered	
	number.	
	• Write a C Program to convert Decimal number to Binary	
	number.	
	• WAP to compute the sum of the first n terms of the fol-	
	lowing series $S = 1+1/2+1/3+1/4+$	
	• Write a C program to perform the factorial of given num	
	• write a C program to perform the factorial of given num-	
	ber.	
	• Write a C program to count the number of positive, nega-	
	tive and zero number in the given list of numbers.	
	• Suppose you need to generate a result table which consists	
	of student id, student name, marks of three subject and to-	
	tal marks. Write a program which takes input for ten stu-	
	dents and displays result table. Also display student in-	
	formation separately who got the highest total. USE	
	STUCTURES.	
	• WAP to enter an integer array of size 10 and perform fol-	
	lowing operations on it	
	a) Display the Elements	
	b) Calculate the Sum and Average of Array	
	c) Find largest element	
	d) Find second largest element	
	a) Find the Smallest element	
	e) Find the Smallest element.	
	1) Display the Array in Reverse order.	
	g) Exit	
	• WAP to display Fibonacci series (i)using recursion, (ii)	
	using iteration	
	• Write a menu driven program to perform following opera-	
	tions on strings:	
	a. Show address of each character in string	
	b. Concatenate two strings without using streat function.	
	c. Concatenate two strings using streat function.	
	d. Compare two strings	
	e. Calculate length of the string (use pointers)	
	f. Convert all lowercase characters to uppercase	
	g. Convert all uppercase characters to lowercase	
	h. Calculate number of vowels	
	i. Reverse the string	
	č	
	Suggested Evaluation Methods	
Interr	al Assessment.	End Term Evam-
> T	heory	ination.
•	Class Participation: 4	A three hour exam
•	Seminar/presentation/assignment/quiz/class test etc.:4	for both theory and
1		· · · · · ·

• Mid-Term Exam: 7	practicum.	
 Practicum Class Participation: 2 Seminar/Demonstration/Viva-voce/Lab records etc.:3 Mid-Term Exam: NA 		
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		

- YashwantKanetkar, "Let us C", BPB Publications, 2002 •
- •
- •
- E. BalaGuruswamy, "Programming in ANSI C", TMH, 1999.
 Al Kelly and Ira Pohl, "A Book on C", (4th Ed.), Addison Wesley, 1999.
 B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI, 2000. •
- Kernighan & Ritchie, "The C Programming Language ANSI C Version", Prentice Hall • Software Series
- Herbert Schildt "ANSI C Made Easy", Osborne McGraw-Hill •

Session: 2023-24			
1	art A - Introductio		
Subject	COMPUTER SCIENCE		
Semester	Π		
Name of the Course	Cloud Computing Skills		
Course Code	B23-SEC-201		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per An- nexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: Get acquainted with the term Cloud computing. Understand various types of free and commercial clouds. Understands various types of cloud services like SaaS. PaaS and IaaS. Know how the Cloud Computing is changing software industry 		
	5^* . to create and	use Cloud.	
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks: 55(35(T)+20(P))Time: 3 Hrs.(T), 3Hrs.(P)		3Hrs.(P)	
Part B- Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question			

will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
Ι	Basic Concepts of Cloud Computing Computer Network Basics. Concepts of Distributed Systems. Concepts of Cloud Computing and its Necessity. Cloud Service Providers in use and their Significance.	6
II	Cloud Infrastructure Cloud Pros and Cons. Cloud Delivery Models. Cloud Deployment Models.	6
III	Cloud Storage Management Concept of Virtualization and Load Balancing. Overview on Virtualization used for Enterprise Solutions. Key Challenges in managing Information. Identifying the problems of scale and management in big data.	6
IV	Building Cloud Networks Designing and Implementing a Data Center-Based Cloud Installing Open Source Cloud service. Amazon Web Services (AWS). Google Cloud Platform.	6
V*	Practicum: • Creating & using Amazon(AWS) Account • Creating & using Google Account	25
	Suggested Evaluation Methods	
Inter >] • • • • •	nal Assessment: Theory Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.: 4 Mid-Term Exam: 7 Practicum Class Participation: 2 Seminar/Demonstration/Viva-voce/Lab records etc.: 3 Mid-Term Exam: NA	End Term Ex- amination: A three hour exam for both theory and practicum.
	Part C-Learning Resources	
 Recommended Books/e-resources/LMS: Cloud Computing: Concepts, Technology & Architecture By Thomas Erl, Ricardo Cloud computing a practical approach Anthony T.Velte, Toby J.Velte Robert Elsenpeter, TATA McGraw-Hill, New Delhi– 2010 Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online -Michael Miller-Que2008 Moving to Cloud by Dinkar Sitaram, Geetha Manjunath, Publication: Syngress Elsevier Inc, 2014(2ndEdition) Cloud Computing Second Edition by Dr Kumar Saurabh, Publication Willy INDIA (2013) Cloud Computing Bible by Barrie Sosinsky, Publisher Willy INDAI (2014) Cloud computing for Dummies-Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Wiley Publishing, Inc, 2010 Cloud Computing(Principles and Paradigms),Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011 		
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Advance IT Skills		
Course Code	B23-SEC-301		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per An- nexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. Use e-Governance applications; and use computer to improve existing skills and learn new skills 2. Using internet for Digital Financial services 3. understand the concept of Cyber security and issues and challenges associated with it 4. Develop knowledge about Future Skills 		
	5*. to understand the various concepts in the syllabi practically.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks: 55(35(T)+20(P))		Time: 3 Hrs.(T),	3Hrs.(P)
Part B- Contents of the Course			

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of

three-hour duration.			
Unit	Topics	Contact Hours	
Ι	WWW and E-Governance - Website Address and URL, Introduction to IP, Address, ISP and Role of ISP, Internet Protocol, Modes of Connecting Internet (HotSpot, Wifi, LAN Cable, BroadBand, USB Tethering), Identifying and uses of IP/MAC/IMEI of various devices, Downloading Web Pages, Printing Web Pages Introduction to Blogs, Basics of E-commerce, Netiquettes, Overview of e-Governance Services like Railway Reservation, Passport, eHospital [ORS], Accessing e-Governance Services on Mobile	5	
Π	Digital Financial Tools and Applications Digital Financial Tools, Understanding OTP [One Time Password]and QR [Quick Response] Code, UPI [Unified Payment Interface], AEPS [Aadhaar Enabled Payment System], USSD[Unstructured Supplementary Service Data], Card [Credit / Debit], eWallet, PoS [Point of Sale], Internet Banking, National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), Immediate Payment Service (IMPS), Online Bill Payment	5	
III	Cyber Security: Cyber Security, Defining Cyberspace, Architecture of cyberspace, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security. Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organisations dealing with Cybercrime and Cyber security in India.	7	
IV	Overview of Futureskills: Introduction to Internet of Things (IoT), Big Data Analytics, Cloud Computing, Virtual Reality, Artificial Intelligence, Social & Mobile, Blockchain Technology, 3D Printing/ Additive Manufacturing, Robotics Process Automation.	7	
V*	 Practicum: WWW and E-Governance: Understanding the various devices related to Internet Using e-governance services Writing e-blogs. Digital Financial Tool: Using digital financial tools. Cyber Security: Checklist for reporting cyber-crime at Cybercrime Police Station Checklist for reporting cybercrime online Reporting phishing emails 	25	

Demonstration of email phishing attack and preventive		
measures.		
Futuristic Technology:		
Introducing various futuristic technologies.		
Suggested Evaluation Methods		
Internal Assessment:	End Term Ex-	
> Theory	amination:	
Class Participation: 4	A three hour	
• Seminar/presentation/assignment/quiz/class test etc.: 4	exam for both	
• Mid-Term Exam: 7	theory and	
> Practicum	practicum.	
• Class Participation: 2		
• Seminar/Demonstration/Viva-voce/Lab records etc.: 3		
• Mid-Term Exam: NA		
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
• Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition		
	11 15	
• Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspec-		
tives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)		
• Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry		
A. Onver, Create Space independent Publishing Platform. (Pearson, 13th November, 2001)		
 Electronic Commerce by Elias M Awad Prentice Hall of India Pyt 	Ltd	
- Electronic commerce by Enastri, transfer internet of main i will fut.		

• Computer Fundamentals - By Pradeep K. Sinha, Priti Sinha, BPB Publications, 6th Edition

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Data Management		
Course Code	B23-SEC-302		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	SEC		
Level of the course (As per An- nexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: Describe major components of DBMS and their functions Model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model. Write queries in relational algebra / SQL Normalize a given database schema to avoid data anomalies and data redundancy. 		
	5*. to implement the concepts of databases using SQL.		bases using SQL.
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(15(T)+5(P)) End Term Exam Marks: 55(35(T)+20(P))		Time: 3 Hrs.(T),	3Hrs.(P)
Part B- Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory.			

Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First

question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
Ι	Database Management System – Introduction and Purpose, Database Architectures: Centralised, Client-Server, Parallel, Distributed, Web based system: Web architecture (2 tier, 3 tier, N-tier Architecture) Database Storage Structures: Introduction, Indexing, Hashing, Data Dictionary.	6
Π	Data Models: Introduction to various data models, Cardinality Ratio & Relationships, Representation of entities, attributes, relationship attributes, relationship set, Generalization, aggregation, Structure of relational Database and different types of keys, Codd's rules and Relational data model	6
III	Relational Database design: Basic System Development Life Cycle, Database Design – ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1NF, 2NF, 3NF)	6
IV	SQL queries: SQL data definition, data types, specifying constraints, Queries for retrieval, insertion, deletion, updation, introduction to views.	6
V*	Practicum: Create and use the following database schema to answer the given queries. EMPLOYEE Schema: Field Type NULL KEY DEFAULT Eno Char(3) NO PRI NIL Ename Varchar(50) NO NIL Job_type Varchar(50) NO NIL Job_type Varchar(50) NO NIL Manager Char(3) Yes FK NIL Hire_date Date NO NIL Dno Integer YES FK NIL Commission Decimal(10,2) YES NIL Salary Decimal(7,2) NO NIL DEPARTMENT Schema: Field Type NULL KEY DEFAULT Dno Integer No PRI NULL Dname Varchar(50) Yes NULL Location Varchar(50) Yes New Delhi Query List 1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Table. 3. Query to display the Employee Name concatenated by a Job separated by a comma.	25

4. Query to display all the data from the Employee Table. Separate	
THE OUTPUT.	
5. Query to display the Employee Name and Salary of all the	
employees earning more than \$2850.	
6. Query to display Employee Name and Department Number for the	
Employee No= 7900.	
7. Query to display Employee Name and Salary for all employees	
whose salary is not in the range of \$1500 and \$2850.	
8. Query to display Employee Name and Department No. of all the	
Q. Query to display Name and Hire Date of every Employee who	
was hired in 1981	
10. Query to display Name and Job of all employees who don't have	
a current Manager.	
11. Query to display the Name, Salary and Commission for all the	
employees who earn commission.	
12. Sort the data in descending order of Salary and Commission.	
13. Query to display Name of all the employees where the third letter	
of their name is 'A'.	
14. Query to display Name of all employees either have two K s or have two 'A's in their name and are either in Dept No = 30 or their	
Manger's Employee $N_0 = 7788$	
15. Ouery to display Name. Salary and Commission for all	
employees whose Commission amount is 14 greater than their Salary	
increased by 5%.	
16. Query to display the Current Date.	
17. Query to display Name, Hire Date and Salary Review Date	
which is the 1st Monday after six months of employment.	
18. Query to display Name and calculate the number of months	
between today and the date each employee was mired. 19. Ouery to display the following for each employee earns $<$	
Salary > monthly but wants $< 3 *$ Current Salary > I abel the Column	
as Dream Salary.	
20. Query to display Name with the 1st letter capitalized and all	
other letter lower case and length of their name of all the employees	
whose name starts with 'J', 'A' and 'M'.	
21. Query to display Name, Hire Date and Day of the week on which	
the employee started.	
22. Query to display Name, Department Name and Department No	
23 Ouery to display Unique Listing of all Jobs that are in	
Department # 30, 24, Ouery to display Name, Dept Name of all	
employees who have an 'A' in their name.	
25. Query to display Name, Job, Department No. And Department	
Name for all the employees working at the Dallas location.	
26. Query to display Name and Employee no. Along with their	
Manger's Name and the Manager's employee no; along with the	
Employees' Name who do not have a Manager.	
2/. Query to display Name, Dept No. And Salary of any employee	
And the salary of any employee who earns a commission	
And the satary of any employee who earns a commission.	

	 28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies \$100. 29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees 30. Query to display the number of employees performing the same Job type functions. 31. Query to display the no. of managers without listing their names. 32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department. 33. Query to display to display Name and Hire Date for all employees in the same dept. as Blake. 34. Query to display the Employee No. And Name for all employees who earn more than the average salary. 35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a 'T'. 36. Query to display the department no, name and job for all 		
	employees in the Sales department		
	Suggested Evaluation Methods		
Interr > T • • • • • • • • • •	nal Assessment: heory Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.: 4 Mid-Term Exam: 7 racticum Class Participation: 2 Seminar/Demonstration/Viva-voce/Lab records etc.: 3 Mid-Term Exam: NA	End Term Ex- amination: A three hour exam for both theory and practicum.	
Part C-Learning Resources			
 Recommended Books/e-resources/LMS: Elmasri, R., & Navathe, S.B. (2015). Fundamentals of Database Systems. 7th edition. Pearson Education. Date, C. J. (2004). An Introduction to database systems. 8th edition. Pearson Education. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2010). Database System Concepts. 6th 			

edition. McGrawHill.

*Applicable for courses having practical component.