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 (2nd Semester) for Under-Graduate Programmes Subject: Computer Science

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)

Session: 2023-24				
Part A - Introduction				
Subject	COMPUTER SCIENCE			
Semester	II	II		
Name of the Course	Web Development			
Course Code	B23-CSE-201			
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 websites. 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 web development concepts. 				
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)				
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 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. The first question will be compulsory.

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	11
II	Creating a Website and Introduction to Markup 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.	11
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.	12
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	11
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 an ordered list and an unordered list. Design a web page to show your institute with hyperlinks. Create your resume on an HTML page. Create a web page and 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 college records in the form of a table. Write an HTML code to add internal CSS on a webpage Design a blog-style personal website. 	30

• 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 web pages.		
• 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		
e) After clicking a 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 Seminar/presentation/assignment/quiz/class test etc : 5 	A three-hour	
 Mid-Term Exam: 10 	theory and	
> Prostigum	practicum.	
Class Participation: NA	End Term	
 Seminar/Demonstration/Viva-voce/Lab records etc.: 10 	Exam Marks:	
Mid-Term Exam: NA	70(50(1)+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 McGr	aw-Hill	
• Wendy Willard, HTML Beginners Guide, Tata McGraw-Hill.		

- Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI
- 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	COMPUTER SCIENCE			
Semester	II			
Name of the Course	Programming with	C++		
Course Code	B23-CSE-202			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	DSEC			
Level of the course (As per Annexure-I	100-199	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 basic concept of C++;2. acquire the knowledge of C++ operators, hierarchy and precedence, and various control structures3. learn to use arrays and strings in C++ programs;4. get familiar with OOPS concepts with C++ 5*. understand the programming with C++ for Object-Oriented methodologies.			
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))			3Hrs.(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 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. The first question will be compulsory.

Unit	Topics	Contact Hours
Ι	Elements to C++ : Character Set, Keywords, Identifiers, Constants, Variables, Date Types: User-Defined, Built-in, Derived Data Types, Reference Variables Constants, Symbolic constants, Type Conversion, and Type Casting.	11
	Input Output in C++ : Unformatted and Formatted I/O Operations. I/O using insertion and extraction operators and streams in C++.	
	Operators in C++ : Arithmetic, Relational, Logical, Ternary, and other type of operators, Precedence & associativity of Operators.	
II	Decision and Control Structures : if statement, if-else statement, nested if, if-else-if ladder, switch case statement, break and continue, goto statement, nested switch case statement. Loops : while loop, do-while loop, for loop.	11
	Arrays and strings : Array definition, initialization, multidimensional arrays, Manipulation of array elements.	
	Functions : Declaration and Definition, return values, arguments, passing parameters by value, call by reference, call by pointer, Recursion, Inline Functions, Function overloading.	
III	Pointers, structures, and union in C++.	11
	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.	
IV	Operator Overloading: Overloading unary and binary operators: arithmetic	12
	Inheritance : Derived class, base class, Accessing the base class member,	
	Inheritance: multilevel, multiple, hierarchical, hybrid; Virtual base class, Abstract class.	
	Virtual Functions, pure virtual functions; Polymorphism & its types	
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 	30
	 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 C++ program to prompt the user to input 3 integer values and print these in forward and reversed order.	
	• WAP to accept and display distance in feet and inches.	
	• Write a program to swap the values of two variables without using a third variable.	
	• 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		
•	Create a class called cube with the data members		
	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 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 Polymorphism in Class		
	C_{++} Program to Show Function Overloading		
•	C++ Program to Show Inheritance		
	Suggested Evaluation Methods		
Internal As	ssessment:	End-Term	
> Theory	y	Examination:	
Class	Participation: 5	A three-hour	
• Semi	nar/presentation/assignment/quiz/class test etc.: 5	exam for both	
Mid-	Term Exam: 10	theory and	
➤ Praction	cum	practicum.	
Class	Participation: NA	End Term	
• Semi	nar/Demonstration/Viva-voce/Lab records etc.: 10	70(50(T)+20(
Mid-	Term Exam: NA	P))	
	Part C-Learning Resources		
Recommer	nded Books/e-resources/LMS:		
• Herbe	ert Scildt, C++, The Complete Reference, Tata McGraw-Hill		
Rober	• 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.			
Richa	 Richard Johnson, An Introduction to Object-Oriented Application Development, 		
Thomson Learning.			

Session: 2023-24				
Part A - Introduction				
Sub	ject	COMPUTER SCIENCE		
Sen	nester	II		
Nan	ne of the Course	Programming Meth	odologies	
Cou	urse Code	B23-CSE-203		
Cou (CC M/D VA0	urse Type: /MCC/MDC/CC- DSEC/VOC/DSE/PC/AEC/ C)	CC-M		
Leve Ann	el of the course (As per exure-I	100-199		
Pre- any)	requisite for the course (if			
Cours	se Learning Outcomes (CLO):	 O): After learning this course students will be able to: Understand the problem-solving using algorithms and flowcharts. understand the concept of program and debugging. learn the basic programming constructs. understand various programming methodologies. understand the various programming methodologies by implementing these practically. 		
Cre	edits	Theory	Practical	Total
		1	1	2
Co	ntact Hours	1	2	3
Ma Int Enc	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)			Hrs.(P)
Part B-Contents of the Course				
Instructions for Paper-Setter				
Unit Topics		Contact Hours		
I	IProblem Solving: Understanding the problem, Analyzing the problem, and Identifying the solution.4Tools for Problem-Solving: Flowcharts and its Symbols. Algorithm4			4
1	designing. Examples of Algorit	inns with now chart.	Decision radie.	

II	Program : Concept of a program, Need for writing programs, Characteristics of a good program, Programming style, Documentation, and Program Maintenance.	4
	Debugging Programs : Syntax Errors, Run-Time Errors, Logical Errors.	
	Process of conceptualizing a solution to a problem and moving from algorithm to programming.	
III	General Concepts : Clarity and Simplicity of Expressions, Use of proper names for Identifiers, Comments, Indentation; and Documentation.	4
	Programming Constructs : Sequence, Selection, and Iteration; Simulation (dry run) of the program for better understanding of algorithm; Comparison and Analysis of Algorithms through simulations.	
IV	Methodologies : Structured programming, Top-down approach, Bottom-up approach, Functional programming, Modular programming, and Object-oriented programming.	3
	 Students are advised to do laboratory/practical practice not limited to but including the following types of problems: Draw a flowchart and design an algorithm that calculates simple interest using principle, rate, and time. Draw a flowchart and write an algorithm to swap the values of two variables. Draw a flowchart and design an algorithm to check whether the given number is even or odd. Draw a flowchart and design an algorithm that inputs three numbers and displays the largest number. Draw a flowchart and design an algorithm to find the smallest from n numbers. Draw a flowchart and design an algorithm to find the greatest from n numbers. Draw a flowchart and design an algorithm to find the sum and average of n input numbers. Draw a flowchart and design an algorithm to find the sum of the digits of the input number. Identify the requirements for a college system computerization. Identify the various modules in a banking system. Draw the decision table for checking eligibility for admission to college in an undergraduate programme taking system. 	30
	Suggested Evaluation Methods	

Internal Assessment: ➤ Theory • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.: NA • Mid-Term Exam: 6 ➤ Practicum • Class Participation: NA • 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:35(20(T)+15 (P))
Part C-Learning Resources	
 Text /Reference Books: 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, Leo Rajaraman, V., Fundamentals of Computers, PHI. 	n Tech World.

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIE	INCE	
Semester	II		
Name of the Course	Web Technologies	Fundamentals	
Course Code	B23-CSE-204		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MDC		
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 websites. implement HTML and CSS for web page designing. Understand the design of web crawlers and search engines. 5*. implement the programs based on variousweb development concepts. 		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P)) Internal Assessment Marks:20(1 End Term Exam Marks: 55(35(1	5(T)+5(P)) Γ)+20(P))	Time: 3 Hrs.(T),	3Hrs.(P)
Part	B- Contents of the	Course	
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 must attempt five questions, selecting one from each unit. The first question will be compulsory. The practicum will be evaluated by an external and an internal examiner. The examination will be of 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.	7
II	Web Publishing: Hosting website; Internet Service Provider; Planning and designing website; Web Graphics Design, steps for Developing website	7
	Creating a Website and Introduction to Markup Languages (HTML and DHTML),	
III	HTML Document Features & Fundamentals, HTML Elements, Creating Links; Headers; Text styles; Text Structuring; Text color 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	8
IV	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. Introduction to Client–Side Programming	8
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 an ordered list and an unordered list. Design a web page to show your institute with hyperlinks. Design a blog-style personal website. Create your resume on an HTML page. Create a web page and 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 college records in the form of a table. Write an HTML code to add internal CSS on a webpage Design a web page to display your college with hyperlinks. Write a JavaScript function to calculate the sum of two numbers. Use Div and span in a page and color two words with the same colors. Using HTML, and CSS create a styled checkbox with animation on state change. 	30
	Suggested Evaluation Methods	

Internal Assessment:	End-Term
 Theory Class Participation: 4 Seminar/presentation/assignment/quiz/class test etc.:4 Mid-Term Exam: 7 	Examination: A three-hour exam for both theory and
 Practicum Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc.:5 Mid-Term Exam: NA 	practicum. End Term Exam Marks: 55(35(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.
- Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI
- 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.

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



Syllabus of Examination (4th Semester) for Under-Graduate Programmes Subject: Computer Science

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)

Session: 2023-24				
Part A – Introduction				
Subject	COMPUTER SCIE	ENCE		
Semester	IV			
Name of the Course	Data Management with DBMS			
Course Code	B23-CSE-401	B23-CSE-401		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	СС			
Level of the course (As per Annexure-I)	200-299			
Pre-requisite for the course (if any)				
Course Learning Outcomes(CLO):	 ag Outcomes(CLO): After completing this course, the learner will be able to: learn basic concepts of database along with its functions and components understand data models. understand SQL as a query language and Learn the concept of relational algebra and calculus. acquire knowledge of advanced concepts of DBMS. 5*. implement the queries based on database management 			
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 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 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 in all, selecting one question from each unit. The first question will be compulsory.

Unit	Topics	Contact Hours
Ι	 Basic Concepts: Data, Information, Records, Files, Schema and Instance etc. Limitations of File-Based Approach, Characteristics of Database Approach, Database Management System (DBMS), 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 	11
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	11
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. 	12
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.	11
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: Write a SQL query for creating and describing a table of the salesman in a company. Write a query to insert data into a table. Write a SQL statement to display all the information of all salesmen. Write a query that will retrieve the value of the salesman if of all salesman, getting orders from the customers in the orders table without any repeats. 	30

• Write a SQL statement to display the name and city of the	
salesman, who belongs to the city of Paris.	
• Write a SQL statement to display all the information for those	
customers with a grade of 200.	
• Write a SQL statement to delete a particular record from a	
table	
• Write an SQL statement that selects the highest grade for each	
of the cities of customers using the GROUP BY clause.	
• Write an SQL statement that selects the particular record	
using the ORDER BY clause.	
• Write a SQL statement to prepare a list with the salesman's	
name, the customer's name, and their cities for the salesman	
and customer who belong to the same city,	
• Write a SQL statement to know which salesman is working	
for which customers.	
• Write an SQL statement to create a view of the table.	
• Write an SQL statement to rename, update, and delete a view.	
• Write an SQL statement to update the record in a table.	
• Write a SQL statement to drop and truncate a table.	
Understanding relational model concepts	
• Converting a table into various normal forms.	
Understanding various concepts of databases	
Suggested Evaluation Methods	<u> </u>
Internal Assessment:	End-Term
> Theory	Examination:
• Class Participation: 5	A three-hour
• Seminar/presentation/assignment/quiz/class test etc.: 5	exam for both
• Mid-Term Exam: 10	practicum
> Practicum	End Term
Class Participation: NA Saminar/Demonstration/Vive vege/Lab records at a 10	Exam Marks:
 Seminar/Demonstration/ viva-voce/Lab records etc.: 10 Mid-Term Exam: NA 	70(50(T)+20(
	P))
Part C-Learning Resources	
Recommended Books/e-resources/LMS:	
• Elmasri & Navathe: Fundamentals of Database Systems, Pearson Educ	ation.
• Thomas Connolly Carolyn Begg: Database Systems, Pearson Education	
Korth & Silberschatz: Database System Concept, McGraw Hill Internat	tional Edition.
Kagnu Kamakrisinan & Jonannes Genrke: Database Management Syst Hill	ems, wicofaw

• Ivan Bayross: SQL, PL/SQL- The Program Language of ORACLE, BPB Publication.

Session: 2023-24				
Part A - Introduction				
Subject COMPUTER SCIENCE				
Semester	IV	IV		
Name of the Course	Introduction to Cor	Introduction to Computer System Design and Organization		
Course Code	B23-CSE-402			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MCC			
Level of the course (As per Annexure-I	evel of the course (As per 200-299 nnexure-I			
Pre-requisite for the course (if any)	B23-CSE-102			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: understand number systems, error detecting and correcting code, and representations of numbers in a computer system. understand computer arithmetic and Boolean algebra and simplification of Boolean expressions. understand the working of logic gates and design various combinational circuits using these logic gates. understand the working of different types of flip-flops and design different types of registers. 5*. understand the practical aspects of computer system design and organization of computers. 			
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)				
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 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 in all, selecting one question from each unit. The first question will be compulsory.

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	11
	Representations: Integer numbers - sign-magnitude, 1's & 2's complement representation. Real Numbers normalized floating point representations.	
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.	11
	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 & Theorems, Kaurnaugh-Maps (up to four variables), Handling Don't Care conditions.	
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 Subtractor, Multiplexers, Demultiplexers, Decoder Encoder Comparators	11
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.	12
	Serial-In Parallel-Out (SIPO), Parallel-In Serial-Out (PISO) Parallel- In Parallel-Out (PIPO), and shift registers.	
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Number System:	30
	 Problems based on the Number System and their conversion. Programs based on Number System conversion. Binary Arithmetic Problems based on Binary Arithmetic 	
	• Programs based on Binary Arithmetic.	
	 Problems based on Boolean Expression and their simplification 	

Logic Gates		
 Understanding the working of logic Gates 		
Combinatorial Circuita:		
• Designing and understanding various combinational circuits.		
Sequential Circuits:		
• Designing and understanding various sequential circuits.		
Suggested Evaluation Methods		
Internal Assessment:	End-Term	
➤ Theory	Examination:	
Class Participation: 5	A three-hour	
 Seminar/presentation/assignment/quiz/class test etc.: 5 	exam for both	
• Mid-Term Exam: 10	theory and	
> Draatioum	practicum.	
 Close Derticipation: NA 	End Term	
 Class Falticipation, INA Seminar/Demonstration/Viva vaca/Lab records at a 10 	Exam Marks:	
• Seminar/Demonstration/viva-voce/Lab records etc.: 10	70(50(T)+20(
• Mid-Term Exam: NA	P))	
Part C-Learning Resources		
Recommended Books/e-resources/L/MS:		
• M Morris Mano Digital Logic and Computer Design Prentice Hall of India Pyt I td		
• V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Compute	r Design Prentice	
Hall.	1 2 congin, 1 ronnice	

- Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
- Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill.

Session: 2023-24				
Part A - Introduction				
Subject COMPUTER SCIENCE				
Semester	IV			
Name of the Course	Object-Oriented Pr	Object-Oriented Programming with Java		
Course Code	B23-CSE-403			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MCC			
Level of the course (As per Annexure-I 200-299				
Pre-requisite for the course (if any)	B23-CSE-101, B23-CSE-202 and B23-CSE-301.			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: understand the basic concept of JAVA; learn and develop various controls and branching of logic under various cases using language control structures exemplify the usage to implement polymorphism and Inheritance in Java programs. acquire knowledge of Packages, Interfaces, Exceptions, and Multithreading in building efficient applications. understand the programming with JAVA for Object-Oriented methodologies. 			
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)) End Term Exam Marks: 70(50(T)+20(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 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. The first question will be compulsory.

Unit	Topics	Contact Hours
Ι	Key Attributes of Object-Oriented Programming, Introduction to Java, History and Features of Java, Java Virtual Machine (JVM), JDK, Java Runtime Environment;	11
	Basic 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.	
II	Class and Object in Java : Class Fundamentals, creation of Objects, Defining Methods, Argument Passing Mechanism, Constructors, Abstract Class, Static Members.	12
	Array in Java: Defining an Array, Initializing & Accessing Array, Multi-Dimensional Array.	
	String : String Fundamentals, Operations on Array and String, String Constructors, Creating Strings using String Class and StringBuffer Class.	
III	Polymorphism in Java : Basic Concept, Types, Overriding vs Overloading, Run-time and Compile-time polymorphism.	11
	Inheritance: Benefits of Inheritance, Types of Inheritance.	
	Interface: Implementing Interface, extending Interface.	
IV	Package: creating a package, importing and using a package.	11
	Exception handling : try/catch, handling multiple exceptions, throw/throws keyword, finally keyword, user-defined exception.	
	Concepts of Multithreading and Synchronization in Java.	
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. 	30
	• Write a program that inputs the radius and length of a cylinder and displays its area and volume (area $4 - \pi r^2$ Volume-area* length)	
	 Input a string from the user using String data type and String Buffer Class 	
	 Write a Program that demonstrates the use of various String functions. 	
	 Write a program that demonstrates the use of various String Buffer functions. 	

• WAP to handle the Exception using try and multiple catch blocks	
Write a program to illustrate the use of super keyword	
• Write a program to mustrate the use of super keyword.	
• Write a program to demonstrate constructor hierarchy.	
• WAP to find the area of rectangle and circle using Interface.	
• Write a program to demonstrate function overriding.	
• Write a program to restrict class from overriding base class function.	
• Write a Program for Exception Handling for Divide by zero error	
and Null values.	
• WAP to implement multiple inheritance.	
• WAP to show the concept of packages.	
• WAP to show the working of threads in JAVA	
Suggested Evaluation Methods	
Internal Assessment:	End-Term
Internal Assessment: ➤ Theory	End-Term Examination:
Internal Assessment: ➤ Theory • Class Participation: 5	End-Term Examination: A three-hour
 Internal Assessment: ➤ Theory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 	End-Term Examination: A three-hour exam for both
Internal 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
<pre>Internal Assessment:</pre>	End-Term Examination: A three-hour exam for both theory and practicum.
<pre>Internal Assessment:</pre>	End-Term Examination: A three-hour exam for both theory and practicum. End Term
 Internal Assessment: ➤ Theory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 Mid-Term Exam: 10 > Practicum Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc.: 10 	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks:
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • 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))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • 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))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA Part C-Learning Resources	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA Part C-Learning Resources Recommended Books/e-resources/LMS: • Iver Horton Baginning LAVA 2 WBOX Publications New Delbi	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA Part C-Learning Resources Recommended Books/e-resources/LMS: • Ivor Horton, Beginning JAVA 2, WROX Publications, New Delhi ● Patrick Naughton and Herbert Schlitz_LAVA-2 Complete Beference_T	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA Part C-Learning Resources Recommended Books/e-resources/LMS: • Ivor Horton, Beginning JAVA 2, WROX Publications, New Delhi • Patrick Naughton and Herbert Schlitz, JAVA-2 Complete Reference, T • Paul Deital & Harvey Deital Java: How to Program Pearson Education	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA Part C-Learning Resources Recommended Books/e-resources/LMS: • Ivor Horton, Beginning JAVA 2, WROX Publications, New Delhi • Patrick Naughton and Herbert Schlitz, JAVA-2 Complete Reference, T • Paul Deital & Harvey Deital, Java: How to Program, Pearson Education • Balaguruswamy Programming with Java TMH New Delhi	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA • Mid-Term Exam: NA Part C-Learning Resources Recommended Books/e-resources/LMS: • Ivor Horton, Beginning JAVA 2, WROX Publications, New Delhi • Patrick Naughton and Herbert Schlitz, JAVA-2 Complete Reference, T • Paul Deital & Harvey Deital, Java: How to Program, Pearson Education • Balaguruswamy, Programming with Java, TMH, New Delhi. • Java6 Programming, BlackBook, KoGenT, Dreamtech Press.	End-Term Examination: A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))

Session: 2023-24				
Part A - Introduction				
Subject	COMPUTER SCIE	ENCE		
Semester	IV			
Name of the Course	Front-End Development			
Course Code	B23-CSE-404	B23-CSE-404		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	AEC/ DSE			
Level of the course (As per Annexure-I	200-299			
Pre-requisite for the course (if any)	B23-CSE-201			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. understand the basic concept of objects and regular expressions in JavaScript; 2. acquire knowledge of JavaScript events and DOM 3. learn to use forms and BOM in JavaScript; 4. get familiar with jQuery 5*. understand the programming of web pages and handling events using JavaScript and iOuery. 			
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

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. The first question will be compulsory.

Unit	Topics	Contact Hours
Ι	Objects in JavaScript : Introduction to objects, Type of objects in JavaScript, Creating objects, Object methods, Constructor function, Prototype in JavaScript, Inheritance using prototype chain.	11
	Regular Expressions : Introduction to RegExp, Regular expression usage, Modifiers, RegExp patterns, RegExp methods, String methods for RegExp, Type conversion in JavaScript.	
II	Event handling : JavaScript events, Event handler, Event flow, Event bubbling and capturing, Event listeners, Event types.	11
	Document Object Model (DOM) : Introduction to DOM, Types of DOM, DOM standards and methods, Manipulating documents using DOM, Handling images, Table manipulation, Animation, Node and Node-list handling	
III	Browser Object Model (BOM) : Introduction to BOM, DOM vs BOM differences, Window object and methods, BOM navigator, BOM history, BOM location, BOM timer, Introduction to Cookies, Session and persistent cookies.	12
	Form Handling : Introduction to forms, Form processing, Forms object, Accessing data from forms, Form validation, Additional features in forms, Validation APIs	
IV	Introduction to jQuery : jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery HTML, jQuery Traversing, jQuery AJAX, jQuery Misc.	11
V*	 Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: Use of JavaScript in Web page designing Effective web page design Creation of Event listeners in JavaScript Update and modify website elements dynamically using asynchronously retrieved data Style HTML content with JavaScript 	30

• Iterate over arrays and objects using JavaScript for syntax.	
JavaScript Program to Create Objects (4 Different Ways)	
JavaScript Program to Iterate Over an Object	
JavaScript Program to Find Max/Min Value of an Attribute in	
an Array of Objects	
JavaScript Program to Remove Duplicates from an Array of	
Objects	
• Writing programs for event handling in JavaScript.	
• Write a JavaScript function to add rows to a table.	
Write a JavaScript program to remove items from a drop-down	
list.	
• Write a JavaScript program to calculate sphere volume.	
• Write a JavaScript program to get the window width and	
height	
Using BOM navigation and location	
Creating cookies and sessions.	
How can you create forms and perform validations on the	
forms?	
• How can you use jQuery and perform various functions using	
jQuery?	
Suggested Evaluation Methods	
Internal Assessment:	End-Term
> Theory	Examination:
Class Participation: 5	A three-hour
 Seminar/presentation/assignment/quiz/class test etc.: 5 	exam for both
• Mid-Term Exam: 10	theory and
➤ Practicum	practicum.
Class Participation: NA	End Term
• Seminar/Demonstration/Viva-voce/Lab records etc.: 10	Exam Marks:
Mid-Term Exam: NA	70(50(T)+20(D))
Port C L corrige Descurres	1))
Part C-Learning Resources	
Kecommended Books/e-resources/LMS:	
• 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.	
• JavaScript and jQuery: Interactive Front-End Web Development by Jon I	Juckett
• Head First JavaScript Programming: A Brain-Friendly Guide by Elisabet	h Robson and Eric
Freeman	

Session: 2023-24				
Part A - Introduction				
Subject	COMPUTER SCIENCE			
Semester	IV			
Name of the Course	Linux and Shell Programming			
Course Code	B23-CSE-405			
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	DSE			
Level of the course (As per Annexure-I	200-299			
Pre-requisite for the course (if any)	B23-CSE-301			
Course Learning Outcomes(CLO):	 After completing this course, the learner will be able to: 1. understand Linux architecture; 2. ability to 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*. understand the Linux operating system working 			
	and programming Shell.			
Credits	Theory 2	Practical	Total	
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)		

Instructions for Paper-Setter

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. The first question will be compulsory.

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	11		
II	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,	11		
	diff, sort, uniq, grep; Introducing regular expressions			
III	Linux file system : Linux files, inodes and structure and file system, file system components, standard file system, file system types.	11		
	Processes in Linux : starting and stopping processes, initialization processes, mechanism of process creation, Job control in Linux using at, batch, cron & time			
IV	Shell Programming : vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating & executing shell scripts in Linux	12		
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 program to find the area of a square, rectangle, circle, and triangle. Write a shell script to print integer numbers from 1 to 20. 	30		
Suggested Evaluation Methods				
Interr ≻ T • • • • • •	hal Assessment: heory Class Participation: 5 Seminar/presentation/assignment/quiz/class test etc.: 5 Mid-Term Exam: 10 racticum Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc.: 10 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			

Recommended Books/e-resources/LMS:

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