

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

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



Syllabus of Examination (1st Semester) for Under-Graduate
Programmes
Subject: Computer 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)

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA**

Scheme: 2023-24, Syllabus: 2023-24			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	I		
Name of the Course	Programming with Python		
Course Code	B23-CAC-101		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-1/MCC-1		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	None		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. Write simple programs using built-in data structures in Python. 2. Implement arrays and user-defined functions in Python. 3. Solve problems in the respective domain using suitable programming constructs in Python. 4. Solve problems in the respective domain using object-oriented programming concepts in Python. <hr style="width: 20%; margin-left: 0;"/> 5*. to implement the programs based on various concepts of Python.		
Credits	Theory	Practical	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			
<u>Instructions for Paper-Setter</u>			
The examiner will set a total of nine questions. Out of which the first question will be compulsory. Remaining eight questions will be set from four unit 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.

Candidate will have to attempt five questions in all, selecting one question 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
I	Introduction to Programming: Problem-solving strategies; Structure of a Python program; Syntax and semantics; Executing simple programs in Python.	11
II	Creating Python Programs: Identifiers and keywords; Literals, numbers, and strings; Operators; Expressions; Input/output statements; Defining functions; Control structures (conditional statements, loop control statements, break, continue and pass, exit function), default arguments.	11
III	Built-in data structures: Mutable and immutable objects; Strings, built-in functions for string, string traversal, string operators and operations; Lists creation, traversal, slicing and splitting operations, passing list to a function; Tuples, sets, dictionaries and their operations.	12
IV	File and exception handling: File handling through libraries; Errors and exception handling.	11
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: <ul style="list-style-type: none"> • WAP to find the roots of a quadratic equation. • WAP to accept a number 'n' and (a). Check if 'n' is prime (b). Generate all prime numbers till 'n' (c). Generate first 'n' prime numbers (d). This program may be done using functions. • WAP that accepts a character and performs the following: (a). print whether the character is a letter, numeric digit, or, numeric digit, or special character (b). if the character is a letter, print whether the letter is uppercase or lowercase (c). if the character is a numeric digit, print its name in the text (e.g., if the input is 9, the output is NINE) • WAP to perform the following operations on a string (a). Find the frequency of a character in a string. (b). Replace a character with another character in a string. (c). Remove the first occurrence of a character from a string. (d). Remove all occurrences of a character from a string. • WAP to swap the first n characters of two strings. • Write a function that accepts two strings and returns the indices of all the occurrences of the second string in the first 	30

	<p>string as a list. If the second string is not present in the first string, then it should return -1.</p> <ul style="list-style-type: none"> • WAP to create a list of the cubes of only the even integers appearing in the input list (may have elements of other types also) using the following: (a). 'for' loop (b). list comprehension • WAP to read a file and (a). Print the total number of characters, words and lines in the file. (b). Calculate the frequency of each character in the file. Use a variable of dictionary type to maintain the count. (c). Print the words in reverse order. (d). Copy even lines of the file to a file named 'File1' and odd lines to another file named 'File2'. • Write a function that prints a dictionary where the keys are numbers between 1 and 5 and the values are cubes of the keys. • Consider a tuple t1= (1, 2, 5, 7, 9, 2, 4, 6, 8, 10). WAP to perform the following operations: (a). Print half the values of the tuple in one line and the other half in the next line. (b). Print another tuple whose values are even numbers in the given tuple. (c). Concatenate a tuple t2= (11,13,15) with t1. (d). Return maximum and minimum values from this tuple • WAP to accept a name from a user. Raise and handle the appropriate exception(s) if the text entered by the user contains digits and/or special characters. 	
Suggested Evaluation Methods		
<p>Internal Assessment:</p> <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	<p>End Term Examination: A three-hour exam for both theory and practicum.</p>	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Taneja, S., Kumar, N., Python Programming- A Modular Approach, Pearson Education India, 2018. • Balaguruswamy E., Introduction to Computing and Problem Solving using Python, 2nd edition, McGraw Hill Education, 2018. • Brown, Martin C., Python: The Complete Reference, 2nd edition, McGraw Hill Education, 2018. • Guttag, J.V. Introduction to computation and programming using Python, 2 nd edition, MIT Press, 2016 		

*Applicable for courses having practical component.

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA**

Scheme: 2023-24, Syllabus: 2023-24			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	I		
Name of the Course	Operating Systems		
Course Code	B23-CAC-102		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MCC-2		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	None		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand the basic concepts of operating systems and their services along with process management. 2. understand the concept of process scheduling and acquire knowledge of process synchronization. 3. learn about memory management and virtual memory concepts. 4. learn to work with directory structure and security aspects. <hr style="width: 20%; margin-left: 0;"/> 5*. to implement the programs based on operating systems.		
Credits	Theory	Practical	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			
<u>Instructions for Paper-Setter</u>			
The examiner will set a total of nine questions. Out of which first question will be compulsory. 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.

Candidate will have to attempt five questions in all, selecting one question 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
I	<p>Introductory Concepts: Operating System, Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure.</p> <p>Types of Operating System: Real-time, Multiprogramming, Multiprocessing, Batch processing.</p> <p>Operating System Services, Operating System Interface, Service System Calls, and System Programs.</p> <p>Process Management: Process Concepts, Operations on Processes, Process States, and Process Control Block. Inter-Process Communication.</p>	11
II	<p>CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms, Multiple Processor Scheduling, Algorithm Evaluation.</p> <p>Synchronization: Critical Section Problem, Semaphores, Classical Problem of Synchronization, Monitors.</p> <p>Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.</p>	12
III	<p>Memory Management Strategies: Memory Management of Single-User and Multiuser Operating Systems, Partitioning, Swapping, Contiguous Memory Allocation, Paging and Segmentation;</p> <p>Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.</p>	11
IV	<p>Implementing File System: File System Structure, File System Implantation, File Operations, Type of Files, Directory Implementation, Allocation Methods, and Free Space Management.</p> <p>Disk Scheduling algorithm- SSTF, Scan, C- Scan, Look, C-Look. SSD Management.</p>	11
V*	<p>Practicum:</p> <p>Students are advised to do laboratory/practical practice not limited to but including the following types of problems:</p> <ul style="list-style-type: none"> • Working with various operating systems, and performing different operations using operating systems. • Write a program to print file details including owner access permissions, file access time, where file name is given as argument. • Write a program to copy files using system calls. 	30

	<ul style="list-style-type: none"> • 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 a 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		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	<p>End Term Examination:</p> <p>A three-hour exam for both theory and practicum.</p>	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Silberschatz A., Galvin P.B., and Gagne G., Operating System Concepts, John Wiley & Sons. • Godbole, A.S., Operating Systems, Tata McGraw-Hill Publishing Company, New Delhi. • 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. 		

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme: 2023-24, Syllabus: 2023-24			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	I		
Name of the Course	Basics of Computer Science		
Course Code	B23-CAC-103		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-M1		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	None		
Course Learning Outcomes (CLO):	<p>After learning this course students will be able:</p> <ol style="list-style-type: none"> 1. To introduce to the students, a basic understanding of the working of a computer system. 2. To familiarize the students with the concept of algorithms and flowcharts. 3. To familiarize the students with the various types of software. 4. To make the students familiar with the basic internet technology and concepts. 		
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))			
End Term Exam Marks:35(20(T)+15(P))			
Part B-Contents of the Course			
<u>Instructions for Paper-Setter</u>			
Unit	Topics		Contact Hours
I	Introduction to Computers: Definition of Computers, History and Generations of Computers, Characteristics of computer,		4

	Classification of Computers. Fundamental Block diagram of Computer: CPU, Input & Output Unit.	
II	Software: Definition of Software, Types of Software-System software, Application software, and Utility software. Types of Computer Languages, Assemblers, Interpreters, Compiler.	3
III	Introduction to Operating Systems: Types of Operating System, Functions of Operating System. Windows: Introduction to Windows, Starting Windows, Desktop, Task Bar, Opening and closing applications, icons-creating, renaming, and removing. Date and Time setting, Working with files and folders - creating, deleting, opening, finding, copying, moving, and renaming.	4
IV	Networking: Concept, Basic Elements of a Communication System, Data Transmission Media, LAN, MAN, WAN. Introduction of Internet and WWW, Basic working of a Web Browser, Introduction to popular web browsers.	4
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: <ul style="list-style-type: none"> • Dismantling the system unit, recognizing all major components inside a PC, describing the function of each component, and defining the relationship between internal components • Explore and describe some system utilities like regedit, memory portioning, control panel, and window tools. • Understanding the control panel • Date and Time setting. • Working with files and folders-creating, deleting, opening, finding, copying, moving, and renaming. 	30
Suggested Evaluation Methods		
Internal Assessment: <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.: NA • Mid-Term Exam: 6 ➤ Practicum <ul style="list-style-type: none"> • 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.
Part C-Learning Resources		
Text /Reference Books: <ul style="list-style-type: none"> • Fundamentals of Computers, V. Rajaraman 6th edition PHI Learning Private Limited 2014 • Peter Norton: Computing Fundamentals. 6th Edition, McGraw Hill-Osborne,2007 		

- Alexis Leon and Marthews Leon: Introduction to Computers, Leon Vikas,1999.
- Internet Basics. E. Douglas Commer PHI.

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme: 2023-24, Syllabus: 2023-24			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	I		
Name of the Course	Fundamentals of Computer Science		
Course Code	B23-CAC-104		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MDC-1		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	None		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand the basic concepts of operating systems 2. do the basic editing and formatting in a document 3. create basic spread-sheets for different purposes 4. create basic presentations for different applications <hr/> 5*. to understand the working of operating systems 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)	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>The 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. 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.</p> <p>Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.</p>			

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

Unit	Topics	Contact Hours
I	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.	8
II	Memory Systems: Concept of bit, byte, word, nibble, storage locations, and addresses, measuring units of storage capacity, access time, the concept of the memory hierarchy. Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory. I/O Devices: I/O Ports of a Desktop Computer, Device Controller, Device Driver. Input Devices: classification and use, keyboard, pointing devices - mouse, touchpad and trackball, joystick, magnetic stripes, scanner, digital camera, and microphone Output Devices: speaker, monitor, printers: classification, laser, inkjet, dot-matrix. Plotter.	8
III	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.	7
IV	The Internet: Introduction to networks and Internet, history, Internet, Working of the Internet, Modes of Connecting to the Internet. Electronic Mail: Introduction, advantages and disadvantages, User IDs, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.	7
V*	Operating System: <ul style="list-style-type: none"> • Starting with the basics of Operating Systems and its functionalities Computer Basics: <ul style="list-style-type: none"> • Identify the various computer hardware • Understanding the working of the computer • Understanding various types of software Internet and E-mail: <ul style="list-style-type: none"> • Using the Internet for various tasks • Creating and using e-mail. 	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 4 		End Term Examination: A three hour

<ul style="list-style-type: none"> • Seminar/presentation/assignment/quiz/class test etc.:4 • Mid-Term Exam: 7 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.:5 • Mid-Term Exam: NA 	<p>exam for both theory and practicum.</p>
<p>Part C-Learning Resources</p>	
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • 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 Tech World. • Rajaraman, V., Fundamentals of Computers, PHI. 	

*Applicable for courses having practical component.

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समबुद्धि व योग युक्त होकर कर्म करो
(Perform Actions while Stead fasting in the State of Yoga)



Syllabus of Examination (3rd & 4th Semester) for Under-Graduate Programmes
Subject: Computer 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)

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA**

Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	III		
Name of the Course	Object Oriented Programming using C++		
Course Code	B23-CAC-301		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-3/MCC-4		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes(CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. learn the input/output statements and functions in C++. 2. get familiar with OOPS concepts, constructors, and destructors in C++. 3. Learn the various concepts of operator overloading and inheritance. 4. get familiar with concepts of virtual functions and exception handling in C++ language. <hr style="width: 50%; margin-left: 0;"/> <p>5*. Implement the programs based on various concepts of C++.</p>		
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			
<u>Instructions for Paper-Setter</u>			
<p>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</p>			

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
I	<p>Input Output in C++: Unformatted and Formatted I/O Operations. I/O using insertion and extraction operators and streams in C++.</p> <p>Functions: Declaration and Definition, return values, arguments, passing parameters by value, call by reference, call by pointer, Recursion, Inline Functions, Function overloading.</p> <p>Pointers, structures, and union in C++.</p>	11
II	<p>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.</p> <p>Constructors and Destructors: Constructors, Instantiation of objects, Default constructor, Parameterized constructor, Copy constructor and its use, Destructors, Dynamic initialization of objects.</p>	12
III	<p>Operator Overloading: Overloading unary and binary operators: arithmetic operators, manipulation of strings using operators.</p> <p>Inheritance: Derived class, base class, Accessing the base class member, Inheritance: multilevel, multiple, hierarchical, hybrid; Virtual base class, Abstract class.</p>	11
IV	<p>Virtual Functions, pure virtual functions; Polymorphism & its types</p> <p>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.</p>	11
V*	<p>Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems:</p> <ul style="list-style-type: none"> • Write a C++ program to print the following lines: <ul style="list-style-type: none"> • 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. 	30

	<ul style="list-style-type: none"> • Create a class called cube with the data members Length, Breadth, Height <ul style="list-style-type: none"> • Members functions: <ul style="list-style-type: none"> • 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 Function Overriding • C++ Program to Show Polymorphism in Class • C++ Program to Show Function Overloading • C++ Program to Show Inheritance 	
Suggested Evaluation Methods		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	<p>End-Term Examination: A three-hour exam for both theory and practicum.</p> <p>End Term Exam Marks: 70(50(T)+20(P))</p>	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Herbert Schildt, 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. • Richard Johnson, An Introduction to Object-Oriented Application Development, Thomson Learning. 		

*Applicable for courses having practical components.

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA**

Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	III		
Name of the Course	Foundations of Web Development		
Course Code	B23-CAC-302		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MCC-5		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. learn the basics of web development. 2. understand different types of web pages and websites. 3. implement HTML and CSS for web page designing. 4. Understand the design of web crawlers and search engines. <hr/> 5*. Implement the programs based on various concepts of web development.		
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			
<u>Instructions for Paper- Setter</u>			
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 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 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	12
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.	11
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*	<p>Practicum:</p> <p>Students are advised to do laboratory/practical practice not limited to but including the following types of problems:</p> <ul style="list-style-type: none"> • 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 record in the form of a table. • Write an HTML code to add internal CSS on a webpage • Design a blog-style personal website. • 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 	30

	<p>state change</p> <ul style="list-style-type: none"> ● Design a web page that is like a compose page of e-mail. It should have: <ul style="list-style-type: none"> 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		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> ● Class Participation: 5 ● Seminar/presentation/assignment/quiz/class test etc.: 5 ● Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> ● Class Participation: NA ● Seminar/Demonstration/Viva-voce/Lab records etc.: 10 ● Mid-Term Exam: NA 	<p>End-Term Examination: A three-hour exam for both theory and practicum.</p> <p>End Term Exam Marks: 70(50(T)+20(P))</p>	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> ● 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. 		

*Applicable for courses having practical components.

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
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Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	III		
Name of the Course	Programming with C		
Course Code	B23-CAC-304		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MDC-3		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand the concepts of problem-solving on the 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 <hr style="width: 80%; margin-left: 0;"/> 5*. to design programs based on theoretical concepts of C.		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	2	2	4
Max. Marks:75(50(T)+25(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Internal Assessment Marks:20(15(T)+5(P))			
End Term Exam Marks: 55(35(T)+20(P))			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Unit	Topics		Contact Hours
I	Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and		7

	Keywords, Data Types, Assignment Statement, Symbolic Constant. Input/output: Unformatted & Formatted I/O Function, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putchar(), puts().	
II	Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators Operator Hierarchy & Associativity. Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion.	7
III	Decision making with if statement, if-else statement, nested if statement, else-if ladder, switch, break and continue statements, goto statement Looping: for, while, and do-while loop, jumps in loops.	8
IV	Functions: definition, prototype, function call, passing arguments to a function: call by value, call by reference, recursive functions. Arrays: Definition, types, Initialization, multidimensional arrays, Processing on Arrays.	8
V*	The following activities be carried out/ discussed in the lab during the initial period of the semester. Programming Lab: <ul style="list-style-type: none"> • Write a C Program to read the radius and find the area and volume of a sphere • Write a C Program to read three numbers and find the biggest of three • Write a C Program to demonstrate library functions in math.h (at least 5) • Write a C Program to read a number, find the sum of the digits, reverse the number and check it for palindrome • Write a C Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers • Write a C Program to read percentage of marks and to display appropriate grade (using switch case) • Write a C Program to find the roots of quadratic equation (if else ladder) • Write a C program to read marks scored in 3 subjects by n students and find the average of marks and result (Demonstration of single dimensional array) • Write a C Program to remove Duplicate Element in a single dimensional Array • Program to perform addition and subtraction of Matrices • Write a C Program to generate n prime number by defining isprime () function • Write a C Program to find the trace of a square matrix 	30

	using function <ul style="list-style-type: none"> • Write a C Program to read, display and multiply two matrices using functions 	
Suggested Evaluation Methods		
Internal Assessment: <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.:4 • Mid-Term Exam: 7 ➤ Practicum <ul style="list-style-type: none"> • 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.	
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Gottfried, Byron S., Programming with C, Tata McGraw Hill. • Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill. • Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley. • Yashwant Kanetker, Let us C, BPB. • Rajaraman, V., Computer Programming in C, PHI. • Yashwant Kanetker, Working with C, BPB 		

*Applicable for courses having practical component.

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
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Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	IV		
Name of the Course	Computer Graphics		
Course Code	B23-CAC-401		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-4/MCC-6		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	Basic Knowledge of computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. understand the concepts of computer graphics 2. learn and implement point, line, and circle drawing algorithms. 3. acquire knowledge of two-dimensional transformations and line clipping algorithms. 4. understand 3-D graphics concepts and acquire skills for designing 3-D graphics 5*. to design programs based on theoretical concepts of Computer Graphics. 		
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))			
Instructions for Paper-Setter			
<p>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.</p> <p>The candidate must attempt five questions in all, selecting one question from each unit. First question will be compulsory.</p> <p>Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.</p>			

Part B- Contents of the Course		
Unit	Topics	Contact Hours
I	<p>Introduction: History of Computer Graphics (CG), Applications of Computer Graphics, Components of interactive graphics systems</p> <p>Display devices: Refresh CRT, Color CRT, Plasma Panel displays LCD Panels, Raster-scan System, Random scan System, Graphic software, Input/Output Devices, Tablets</p>	11
II	<p>Output Primitives: Points and Lines, Line Drawing Algorithms: DDA algorithm, Bresenham's algorithm,</p> <p>Circle drawing Algorithms: Polynomial Method, Bresenham's algorithm. Parametric representation of Cubic Curves, Bezier Curves</p>	11
III	<p>2D Transformation: Use of Homogeneous Coordinates Systems, Composite Transformation: Translation, Scaling, Rotation, Mirror Reflection, Rotation about an Arbitrary Point. Clipping and Windowing, Clipping Operations.</p> <p>Line Clipping Algorithms: The Mid-Point subdivision method, Cohen-Sutherland Line Clipping Algorithms, Polygon Clipping, Sutherland Hodgeman Algorithms, Text Clipping.</p>	12
IV	<p>3-D Graphics: 3-D object representations, 3-D Transformations: Translation, Rotation, Scaling, Projections,</p> <p>Hidden surface elimination: Back face removal, Depth Buffer algorithm, Scan-line algorithm, Depth sort algorithm, Shading.</p>	11
V*	<p>The following activities be carried out/ discussed in the lab during the semester.</p> <p>Programming Lab:</p> <ul style="list-style-type: none"> • Implement DDA line drawing algorithm for all types of slope. • Implement Bresenham's line drawing algorithm for all types of slopes. • Implement Bresenham's Circle drawing algorithm. • Implement Bresenham's Ellipse drawing algorithm. • Implement various 2-D transformations on objects like lines, rectangles, etc. • Implement to clip a line using the Mid-Point subdivision algorithm • Implement to clip a line using Cohen-Sutherland algorithm • Implement 3-D transformations on objects. 	30
Suggested Evaluation Methods		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p>		<p>End Term Examination:</p> <p>A three-hour exam for both theory and practicum.</p> <p>End Term Exam</p>

<ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	Marks: 70(50(T)+20(P))
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Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Donald Hearn, M. Pauline Baker, Computer Graphics, Pearson Education.
- J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics - Principles and Practice, Pearson Education.
- Newmann & Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
- Rogers, David F., Procedural Elements of Computer Graphics, McGraw Hill.
- Zhigang Xiang, Roy Plastock, Computer Graphics, Tata McGraw Hill.

*Applicable for courses having practical components.

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
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Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	IV		
Name of the Course	Concepts of Data Structures		
Course Code	B23-CAC-402		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MCC-7		
Level of the course (As per Annexure-I)	200-299		
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: <ol style="list-style-type: none"> 1. learn the basics of data structure and algorithm complexities. 2. acquire knowledge of arrays and strings. 3. understand the idea of implementation for linked lists and stacks. 4. learn various searching and sorting techniques along with the implementation of queues. 5* develop the project with data structures. 		
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			
<u>Instructions for Paper- Setter</u>			
<p>The 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.</p>			
Unit	Topics		Contact Hours

I	<p>Data Structure Definition, Data Type vs. Data Structure, Classification of Data Structures, Data Structure Operations, Applications of Data Structures.</p> <p>Algorithm Specifications: Performance Analysis and Measurement (Time and Space Analysis of Algorithms- Average, Best and Worst Case Analysis).</p> <p>Arrays: Introduction, Linear Arrays, Representation of Linear Array in Memory, Two Dimensional and Multidimensional Arrays, Sparse Matrix and its Representation, Operations on Array: Algorithm for Traversal, Selection, Insertion, Deletion and its implementation.</p>	11
II	<p>String Handling: Storage of Strings, Operations on Strings viz., Length, Concatenation, Substring, Insertion, Deletion, Replacement, Pattern Matching</p> <p>Linked List: Introduction, Array vs. linked list, Representation of linked lists in Memory, Traversing a Linked List, Insertion, Deletion, Searching into a Linked list, Type of Linked List.</p>	11
III	<p>Stack: Array Representation of Stack, Linked List Representation of Stack, Algorithms for Push and Pop, Application of Stack: Polish Notation, Postfix Evaluation Algorithms, Infix to Postfix Conversion, Infix to Prefix Conversion, Recursion.</p> <p>Introduction to Queues: Simple Queue, Double Ended Queue, Circular Queue, Priority Queue, Representation of Queues as Linked List and Array, Applications of Queue. Algorithm on Insertion and Deletion in Simple Queue and Circular Queue. Priority Queues.</p>	12
IV	<p>Tree: Definitions and Concepts, Representation of Binary Tree, Binary Tree Traversal (Inorder, postorder, preorder), Binary Search Trees – Definition, Operations viz., searching, insertions and deletion;</p> <p>Searching and Sorting Techniques, Sorting Techniques: Bubble sort, Merge sort, Selection sort, Quick sort, Insertion Sort. Searching Techniques: Sequential Searching, Binary Searching.</p>	11
V*	<p>Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems:</p> <ul style="list-style-type: none"> • Write a program that uses functions to perform the following operations on an array i) Creation ii) Insertion iii) Deletion iv) Traversal. • Write a program that uses functions to perform the following operations on strings i) Creation ii) Insertion iii) Deletion iv) Traversal. • Write a program that uses functions to perform the following operations on a singly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal. • Write a program that uses functions to perform the following operations on a doubly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal • Write a program that implement stack (its operations) using i) Arrays ii) Linked list(Pointers). • Write a program that implements Queue (its operations) 	30

	using i) Arrays and ii) Linked lists (Pointers). <ul style="list-style-type: none"> • Write a program that implements the following sorting i) Bubble sort ii) Selection sort iii) Quick sort. • Write programs for various types of tree traversals. 	
Suggested Evaluation Methods		
Internal Assessment: <ul style="list-style-type: none"> ➤ Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Seymour Lipschutz, Data Structures, Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines. • Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, Data Structures Using C, Pearson Education. • Trembley, J.P. And Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill. • Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Addison- Wesley. <p>* Applicable for courses having practical components.</p>		

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
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Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	IV		
Name of the Course	Java Programming		
Course Code	B23-CAC-403		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	MCC-8		
Level of the course (As per Annexure-I)	200-299		
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: <ol style="list-style-type: none"> 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. 5* develop the project using Java.		
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			
<u>Instructions for Paper- Setter</u>			
<p>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.</p> <p>Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.</p> <p>Practicum will be evaluated by an external and an internal examiner. The examination will be of</p>			

three-hour duration.		
Unit	Topics	Contact Hours
I	Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs.	11
II	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	11
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	11
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.	12
V*	<p>Practicum:</p> <p>Students are advised to do laboratory/practical practice not limited to but including the following types of problems:</p> <ul style="list-style-type: none"> • 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. • 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. • 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”. • Write a program to Copy the text from one file to another using byte stream. 	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 		End Term Examination: A three-hour exam for both theory and

<ul style="list-style-type: none"> • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	practicum.
Part C-Learning Resources	
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • 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. 	

*Applicable for courses having practical components.

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Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	IV		
Name of the Course	Front-end Development		
Course Code	B23-CAC-404		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	DSE-1		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	B23-CAC-302		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 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 jQuery. 		
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			
<u>Instructions for Paper-Setter</u>			
<p>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.</p>			

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

Unit	Topics	Contact Hours
I	<p>Objects in JavaScript: Introduction to objects, Type of objects in JavaScript, creating objects, Object methods, Constructor function, Prototype in JavaScript, Inheritance using prototype chain.</p> <p>Regular Expressions: Introduction to RegExp, Regular expression usage, Modifiers, RegExp patterns, RegExp methods, String methods for RegExp, Type conversion in JavaScript.</p>	11
II	<p>Event handling: JavaScript events, Event handler, Event flow, Event bubbling and capturing, Event listeners, Event types.</p> <p>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</p>	11
III	<p>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.</p> <p>Form Handling: Introduction to forms, Form processing, Forms object, Accessing data from forms, Form validation, Additional features in forms, Validation APIs</p>	12
IV	<p>Introduction to jQuery: jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery HTML, jQuery Traversing, jQuery AJAX, jQuery Misc.</p>	11
V*	<p>Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems:</p> <ul style="list-style-type: none"> • 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 • 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. 	30

	<ul style="list-style-type: none"> • 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		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	<p>End-Term Examination: A three-hour exam for both theory and practicum.</p> <p>End Term Exam Marks: 70(50(T)+20(P))</p>	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • 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 Duckett • Head First JavaScript Programming: A Brain-Friendly Guide by Elisabeth Robson and Eric Freeman 		

*Applicable for courses having practical components.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	COMPUTER APPLICATIONS		
Semester	IV		
Name of the Course	Linux and Shell Programming		
Course Code	B23-CAC-405		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	DSE-1		
Level of the course (As per Annexure-I)	200-299		
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: <ol style="list-style-type: none"> 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. <hr style="width: 20%; margin-left: 0;"/> 5*. to implement the programs based on various shell commands and programs in Linux.		
Credits	Theory	Practical	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			
<u>Instructions for Paper- Setter</u>			
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 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, diff, sort, uniq, grep; Introducing regular expressions.	11
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, and Job control in Linux using at, batch, cron & time.	11
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: <ul style="list-style-type: none"> • 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. • Write a shell script to print integer numbers from 1 to 20. 	30
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory <ul style="list-style-type: none"> • 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

<p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA 	<p>practicum.</p>
<p>Part C-Learning Resources</p>	
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • Yashwant Kanetkar, Unix & Shell programming – BPB Publications. • Richard Petersen, The Complete Reference – Linux, McGraw-Hill. • M.G.Venkateshmurthy, Introduction to Unix & Shell Programming, Pearson Education. • Stephen Prata, Advanced UNIX-A Programmer’s Guide, SAMS Publication. • Sumitabha Das, Your Unix - The Ultimate Guide, Tata McGraw-Hill. 	

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