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

Bachelor of Vocation (Software Development)

B.Voc. (Software Development)

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

<table>
<tr><td colspan="4">Scheme: 2023-24, Syllabus: 2023-24</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="3">I</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Problem Solving through C</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-101</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-A1</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">100-199</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">None</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. learn the basics of C program, data types, and input/output statements.
2. understand different types of operators, their hierarchies, and also control statements of C.
3. implement programs using arrays and strings.
4. get familiar with advanced concepts like structures, union, etc. in C language.
5*. to implement the programs based on various concepts of C.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4">Part B- Contents of the Course</td></tr>
<tr><td colspan="4"><u>Instructions for Paper- Setter</u></td></tr>
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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. 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
I	Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant. Input/output: Formatted I/O Function-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().	11
II	Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators Operator Hierarchy; Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion. Decision making with if statement, if-else statement, nested if statement, else-if ladder, switch and break statement, goto statement, Looping Statements: for, while, and do-while loop, jumps in loops.	11
III	Arrays: One-dimensional arrays - Declaration, Initialization, and Memory representation; Two-dimensional arrays -Declaration, Initialization and Memory representation. Functions: definition, prototype, function call, passing arguments to a function: call by value; call by reference, recursive functions. Strings: Declaration and Initialization, String I/O, Array of Strings, String Manipulation Functions: String Length, Copy, Compare, Concatenate, etc., Search for a Substring.	12
IV	Pointers in C: Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers, and Arrays. User-defined data types: Structures - Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, Array of Structures; Unions - Union definition; the difference between Structure and Union.	11
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:	30

	• To read the radius of a circle and to find the area and circumference • To read three numbers and find the biggest of three • To check whether the number is prime or not • To read a number, find the sum of the digits, reverse the number, and check it for palindrome • To read numbers from the keyboard continuously till the user presses 999 and to find the sum of only positive numbers • To read the percentage of marks and to display an appropriate message (Demonstration of else-if ladder) • To find the roots of the quadratic equation • To read marks scored by n students and find the average of marks (Demonstration of single dimensional array) • To remove Duplicate Elements in a single dimensional Array • To perform addition and subtraction of Matrices • To find the factorial of a number • To generate Fibonacci series • To remove Duplicate Elements in a single dimensional Array • To find the length of a string without using the built-in function • To demonstrate string functions • To read, display, and add two m x n matrices using functions • To read a string and to find the number of alphabets, digits, vowels, consonants, spaces, and special characters • To Swap Two Numbers using Pointers • To demonstrate student structure to read & display records of n students • To demonstrate the difference between structure & union.	
Suggested Evaluation Methods		
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.
Part C-Learning Resources		
Recommended Books/e-resources/LMS: • 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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<tr><td>Semester</td><td colspan="3">I</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Foundations of Computer Science</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-102</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-B1</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">100-199</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">None</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. understand the basics of computer
2. learn about I/O devices and operating systems
3. understand the Internet and its services
4. learn about the threats and security concepts on computers
5*. to understand the working of the operating system, internet, and security-related concepts.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
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<tr><td colspan="4"><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 unit selecting two questions from each unit. The</td></tr>
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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
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, Shareware, Freeware, Firmware, Free Software. 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.	11
II	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. 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.	12
III	The Internet: Introduction to networks and Internet, history, Internet, Intranet & Extranet, Working of Internet, Modes of Connecting to Internet. Electronic Mail: Introduction, advantages and disadvantages, User IDs, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.	11
IV	Threats: Physical & non-physical threats, Viruses, worms, Trojans, Spyware, Keylogers, Rootkits, Adware, Cookies, Phishing, Hacking, Cracking. Computer Security Fundamentals: Confidentiality, Integrity, Authentication, Non-Repudiation, Security Mechanisms, Security Awareness, Security Policy, anti-virus software & Firewalls, backup & recovery.	11

<table>
<tr><td>V*</td><td>Practicum:
Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:
Operating System:
• Starting with the basics of Operating Systems and their functionalities
Computer Basics:
• Identify the various computer hardware
• Understanding the working of the computer
• Understanding various types of software
Internet and E-mail:
• Using the Internet for various tasks
• Creating and using e-mail.
Security:
• Understanding various threats
• How to be safe from virus threats
• Various software to get safe from virus attacks.</td><td>30</td></tr>
<tr><td colspan="3">Suggested Evaluation Methods</td></tr>
<tr><td colspan="2">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</td><td>End Term Examination:
A three-hour exam for both theory and practicum.</td></tr>
<tr><td colspan="3">Part C-Learning Resources</td></tr>
<tr><td colspan="3">Recommended Books/e-resources/LMS:
• Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB.
• Dromey, R.G., How to Solve it By Computer, PHI.
• Norton, Peter, Introduction to Computer, McGraw-Hill.
• Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World.
• Rajaraman, V., Fundamentals of Computers, PHI.</td></tr>
</table>

*Applicable for courses having practical component.

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<tr><td>Semester</td><td colspan="3">I</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Logical Organization of Computer</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-103</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-C1</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">100-199</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Basic Knowledge of Mathematics (10th Level)</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. understand number systems, error detecting correcting code, and representations of numbers in a computer system.
2. understand computer arithmetic and Boolean algebra and simplification of Boolean expressions.
3. understand working of logic gates and design various combinational circuits using these logic gates.
4. understand the working of different types of flip-flops and design different types of registers.
5*. to understand the practical aspects of the logical organization of computers.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="4">Part B- Contents of the Course</th></tr>
</table>

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 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
I	Number Systems: Binary, Octal, Hexadecimal, etc. Conversions from one number system to another, BCD Number System. BCD Codes: Natural Binary Code, Weighted Code, Self-Complimenting Code, Cyclic Code. Error Detecting and Correcting Codes. Character representations: ASCII, EBCDIC, and Unicode. Number Representations: Integer numbers - sign-magnitude, 1's & 2's complement representation. Real Numbers normalized floating point representations.	11
II	Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Compliment representations, Addition and subtraction with BCD representations. Boolean Algebra: Boolean Algebra Postulates, basic Boolean Theorems, Boolean Expressions, Boolean Functions, Truth Tables, Canonical Representation of Boolean Expressions: SOP and POS, Simplification of Boolean Expressions using Boolean Postulates & Theorems, Kaurnaugh-Maps (upto four variables), Handling Don't Care conditions.	11
III	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. Their symbols, truth tables and Boolean expressions. Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtracor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	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. Sequential Circuits: Designing registers –Serial-In Serial-Out (SISO),	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: • Problems based on 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 working of logic Gates. Combinatorial Circuits: • Designing and understanding various combinational circuits. Sequential Circuits: • Designing and understanding various sequential circuits.	30
Suggested Evaluation Methods		
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.
Part C-Learning Resources		
Recommended Books/e-resources/LMS: • M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd. • V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall. • Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd. • Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill.		

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
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<table>
<tr><th colspan="4">Scheme: 2023-24, Syllabus: 2023-24</th></tr>
<tr><th colspan="4">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="3">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="3">I</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Mathematical Foundations for Computer Science-I</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-104</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-M1</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">100-199</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">None</td></tr>
<tr><td>Course Learning Outcomes (CLO):</td><td colspan="3">After learning this course student will be able to:
1. Gain knowledge of set theory, types of sets, and operations on sets. Understand various concepts of matrices and determinants, and acquire the cognitive skills to apply different operations on matrices and determinants.
2. Know the basic concepts of complex numbers and acquire skills to solve linear quadratic equations.
3. Gain the knowledge of the concepts of Arithmetic progression, Geometric progression, and Harmonic progression, and find A.M., G.M., and H.M. of given numbers.
4. Understand the concept of differentiation
5. * Attain the skills to make use of the learned concepts of Introductory Mathematics in multidisciplinary learning contexts and to know their applications</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>1</td><td>1</td><td>2</td></tr>
<tr><td>Contact Hours</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td colspan="2">Max. Marks:50(30(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
</table>

Internal Assessment Marks:15(10(T)+5(P)) **End Term Exam Marks:35(20(T)+15(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. 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
I	Sets and their representations, Empty sets, Finite and infinite sets, Subsets, Equal sets, Power sets, Universal sets, Union and intersection of sets, Difference of two sets, Complement of a set, Venn diagram, De-Morgan's laws, and their applications.	4
II	An introduction to matrices and their types, Operations on matrices, Symmetric and skew-symmetric matrices, Minors, and Co-factors. Determinant of a square matrix, Adjoint and inverse of a square matrix, Solutions of a system of linear equations up to order 3.	4
III	Quadratic equations, Solution of quadratic equations. Arithmetic progression, Geometric progression, Harmonic progression, Arithmetic mean (A.M.), Geometric mean (G.M.), Harmonic mean (H.M.), Relation between A.M., G.M. and H.M.	3
IV	The concept of differentiation, differentiation of simple functions, and Use of differentiation for solving problems related to real-life situations. Differentiation of simple algebraic, trigonometric, and exponential functions.	4
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: **Problem Solving**- Questions related to the practical problems based on the following topics will be worked out and a record of those will be maintained in the Practical Note Book: • Problems related to union, intersection, difference, and complement of sets.	30

	• Problems based on De Morgan's Laws. • Problems related to Venn diagrams. • Problems to find the inverse of a matrix. • Problems to find the determinant of a square matrix of order 3. • Problems to find the nth term of A.P., G.P., and H.P. • Problems to find the sum of n terms of A.P., G.P., and H.P. • Problems to find A.M., G.M., and H.M. of given numbers. • Problems involving formulation and solution of quadratic equations in one variable. • Problems to find the first derivatives of functions.	
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.**
Part C-Learning Resources		
Text /Reference Books: • C. Y. Young (2021). *Algebra and Trigonometry*. Wiley. • S.L. Loney (2016). *The Elements of Coordinate Geometry (Cartesian Coordinates)* (2nd Edition). G.K. Publication Private Limited. • Seymour Lipschutz and Marc Lars Lipson (2013). *Linear Algebra.* (4th Edition) Schaum's Outline Series, McGraw-Hill. • C.C. Pinter (2014). *A Book of Set Theory*. Dover Publications. • J. V. Dyke, J. Rogers and H. Adams (2011). *Fundamentals of Mathematics* (10th Edition), Brooks/Cole. • A.Tussy, R. Gustafson and D. Koenig (2010). *Basic Mathematics for College Students* (4th Edition). Brooks Cole		

*Applicable for courses having practical component.

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(Established by the State Legislature Act XII of 1956)

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|| योगस्थ: कुरु कर्माणि ||

समबुद्धि व योग युक्त होकर कर्म करो

(Perform Actions while Stead fasting in the State of Yoga)

Scheme of Examination(3rd and 4th Semester) for Under-Graduate Programmes

Bachelor of Vocation (Software Development)

B.Voc. (Software Development): SCHEME D

according to

Curriculum Framework for Under-Graduate Programmes

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

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

(For the Batches Admitted from 2023-2024)

Kurukshetra University Kurukshetra
Scheme of Examination for Undergraduate programmes
Subject: B.Voc.(Software Development)
According to
Curriculum Framework for Undergraduate Programmes
as per NEP 2020 (Multiple Entry-Exit, Internships, and Choice Based Credit System)

Sem	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs) T + P
3	CC-A3	B23-CSD-301	Java OOP Foundations	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B3	B23-CSD-302	Linux and Shell programming	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-C3	B23-CSD-303	Data Base Technologies	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-M3	B23-CSD-304	Quantitative Foundations of Computer Science	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	MDC-3	To be taken from another department							
	SEC-3	To be taken from SEC Pool							
	AEC-3	To be taken from AEC Pool							
4	CC-A4	B23-CSD-401	Data Structures and Applications	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B4	B23-CSD-402	Front-end Development	3	3	20	50	70	3
			Practical	1	2	10	20	30	3

	CC-C4	B23-CSD-403	Computer Networks	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	AEC-4	To be taken from AEC Pool							
	VAC-3	To be taken from VAC Pool							
	CC-M4(V)	To be taken from VOC Pool							

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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 and 4th Semester) for Under-Graduate Programmes
Bachelor of Vocation (Software Development)
B.Voc. (Software Development)
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
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<tr><th colspan="4">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="3">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="3">III</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Java OOP Foundations</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-301</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-A3</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Knowledge of any Computer Programming Language</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. Implement simple Java programs.
2. Implement multiple inheritance using Interfaces
3. Implement Exception Handling and File Handling.
4. Use AWT to design GUI applications.

5* develop the project using Java.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="4">Part B- Contents of the Course</th></tr>
<tr><td colspan="4"><u>Instructions for Paper-Setter</u>
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. 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.
The practicum will be evaluated by an external and an internal examiner. The examination will</td></tr>
</table>

be of 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*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • WAP to find the sum of 10 numbers, entered as command line arguments. • WAP to find the area of rectangle and circle using Interface. • WAP to implement multiple inheritance. • WAP to show the concept of packages. • WAP to handle the Exception using try and multiple catch blocks and a final 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 appear in the fourth text field. • What are various stream classes in Java? Write Java code to read characters from a file and write into another file. • What are AWT Classes? Write a Java Program to generate Even numbers and Odd Numbers in TextField "T1 and T2 respectively" while pressing buttons "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** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5		**End Term Examination:** A three-hour exam for both theory and

• Mid-Term Exam: 10 ➢ **Practicum** • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	practicum.
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • Schildt, H. (2018). Java: The Complete Reference. 10th edition. McGraw-Hill Education. • Balaguruswamy E. (2014). Programming with JAVA: A Primer. 5th edition. India: McGraw Hill Education • Horstmann, C. S. (2017). Core Java - Vol. I – Fundamentals (Vol. 10). Pearson Education • Schildt, H., & Skrien, D. (2012). Java Fundamentals - A Comprehensive Introduction. India: McGraw Hill Education.	

*Applicable for courses having practical components.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><th colspan="4">Scheme: 2023-24, Syllabus: 2024-25</th></tr>
<tr><th colspan="4">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="3">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="3">III</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Linux and Shell Programming</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-302</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-B3</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Must have basic knowledge of computer</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. understand Linux architecture.
2 use various Linux commands that are used to manipulate system operations.
3 acquire knowledge of Linux File System.
4 understand and make effective use of I/O and shell scripting language to solve problems.
5*. to implement the programs based on various shell commands and programs in Linux.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="4">Part B- Contents of the Course</th></tr>
<tr><td colspan="4"><u>Instructions for Paper-Setter</u>
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.</td></tr>
</table>

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 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: • 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 declares the result. • 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	
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

➢ **Practicum** • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	practicum.
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • 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.	

*Applicable for courses having practical components.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme: 2023-24, Syllabus: 2024-25			
Part A - Introduction			
Subject	B.Voc. (Software Development)		
Semester	III		
Name of the Course	Data Base Technologies		
Course Code	B23-CSD-303		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-C3		
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: 1. understand the basic concepts and structure of database technologies 2. understand the various models used in the database 3. understand various ways to manipulate the data in the database 4. understand the relational model and data representation in a structured manner. 5*. to perform various operations on databases.		
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			

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.
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	Basic Concepts – Data, Information, Records, Files, Schema and Instance etc. Limitations of File-Based Approach, Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc. Database System Architecture – 1-Tier, 2-Tier & Three Levels of Architecture, External, Conceptual, and Internal Levels, Schemas, Mappings and Instances, Data Independence – Logical and Physical Data Independence.	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, Joint Operations and Sub-queries, Constraints and its Implementation in SQL. Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, Cartesian Product, etc. Relational Calculus: Tuple Relational and Domain 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*	The following activities be carried out/ discussed in the lab during the period of the semester. Programming Lab: • Performing various SQL statements. Creating various tables and performing all possible queries based on the syllabus. • Creating and populating a simple database, performing basic CRUD operations.	30

	• Writing complex queries involving joins subqueries, and using indexes. • Understanding relational model concepts • Understanding normalization • Designing a database schema for a given problem, and normalization of the schema.	
Suggested Evaluation Methods		
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.**
Part C-Learning Resources		
Recommended Books/e-resources/LMS: • Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education. • A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, McGraw-Hill. • Thomas Connolly Carolyn Begg, Database Systems, Pearson Education. • C. J. Date, An Introduction to Database Systems, Addison Wesley.		

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><th colspan="4">Scheme: 2023-24, Syllabus: 2024-25</th></tr>
<tr><th colspan="4">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="3">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="3">III</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Quantitative Foundations of Computer Science</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-304</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-M3</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Basic knowledge of mathematics and computer</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. have a strong mathematical foundation for computer science.
2. develop problem-solving and analytical skills.
3. apply mathematical concepts in various areas of computer science
4. understand the recurrence equations.
_____
5*. Encourage interdisciplinary learning and practical application</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="4">Part B- Contents of the Course</th></tr>
<tr><td colspan="4"><u>Instructions for Paper-Setter</u>
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.</td></tr>
</table>

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	Logic and Proof Techniques: Propositional logic, predicate logic, logical equivalences, quantifiers, and proof techniques (direct, contrapositive, contradiction, induction).	11
II	Counting and Combinatorics: Basic counting principles, permutations, combinations, binomial coefficients, and the pigeonhole principle.	12
III	Discrete Probability: Basic probability concepts, conditional probability, Bayes' theorem, random variables, expected value, and variance.	11
IV	Recurrence Relations and Generating Functions: Solving recurrence relations, homogeneous and non-homogeneous relations, generating functions.	11
V*	The following activities will be carried out/ discussed in the lab during the semester. Programming Lab: • Writing proofs and solving logical problems. • Solving combinatorial problems, and applications in algorithm analysis. • Solving probability problems, and simulations using any programming language. • Solving recurrence relations and generating function problems.	30

Suggested Evaluation Methods

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.**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- "Discrete Mathematics and Its Applications" by Kenneth H. Rosen
- "Mathematical Logic" by Ebbinghaus, Flum, and Thomas
- "Concrete Mathematics: A Foundation for Computer Science" by Ronald L. Graham, Donald E. Knuth, and Oren Patashnik

- "Introduction to Combinatorial Analysis" by John Riordan
- "Introduction to Probability" by Dimitri P. Bertsekas and John N. Tsitsiklis
- "A First Course in Probability" by Sheldon Ross
- "Introduction to the Analysis of Algorithms" by Robert Sedgewick and Philippe Flajolet
- "Concrete Mathematics: A Foundation for Computer Science" by Ronald L. Graham, Donald E. Knuth, and Oren Patashnik

*Applicable for courses having practical components.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><th colspan="4">Scheme: 2023-24, Syllabus: 2024-25</th></tr>
<tr><th colspan="4">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="3">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="3">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Data Structures and Applications</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CSD-401</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-A4</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Knowledge of any Computer Programming Language</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
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.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="4">Part B- Contents of the Course</th></tr>
<tr><td colspan="4"><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 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.</td></tr>
</table>

Unit	Topics	Contact Hours
I	**Data Structure** Definition, Data Type vs. Data Structure, Classification of Data Structures, Data Structure Operations, Applications of Data Structures. **Algorithm Specifications**: Performance Analysis and Measurement (Time and Space Analysis of Algorithms- Average, Best and Worst Case Analysis). **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.	11
II	**String Handling**: Storage of Strings, Operations on Strings viz., Length, Concatenation, Substring, Insertion, Deletion, Replacement, Pattern Matching **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.	11
III	**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. **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.	12
IV	**Tree:** Definitions and Concepts, Representation of Binary Tree, Binary Tree Traversal (Inorder, postorder, preorder), Binary Search Trees – Definition, Operations viz., searching, insertions and deletion; Searching and Sorting Techniques, Sorting Techniques: Bubble sort, Merge sort, Selection sort, Quick sort, Insertion Sort. Searching Techniques: Sequential Searching, Binary Searching.	11
V*	**Practicum**: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • 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	30

	i) Arrays ii) Linked list(Pointers). • Write a program that implements Queue (its operations) using i) Arrays and ii) Linked lists (Pointers). • 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: ➢ **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))**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- 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.

* Applicable for courses having practical components.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

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<tr><th colspan="5">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="4">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="4">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="4">Front-end Development</td></tr>
<tr><td>Course Code</td><td colspan="4">B23-CSD-402</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="4">CC-B4</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="4">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="4">B23-CSD-202</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="4">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 jQuery.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td colspan="2">Total</td></tr>
<tr><td>3</td><td>1</td><td colspan="2">4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td colspan="2">5</td></tr>
<tr><td colspan="3">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="5">Part B- Contents of the Course</th></tr>
<tr><td colspan="5"><u>Instructions for Paper-Setter</u>
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.</td></tr>
</table>

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

Unit	Topics	Contact Hours
I	**Objects in JavaScript**: Introduction to objects, Type of objects in JavaScript, creating objects, Object methods, Constructor function, Prototype in JavaScript, Inheritance using prototype chain. **Regular Expressions**: Introduction to RegExp, Regular expression usage, Modifiers, RegExp patterns, RegExp methods, String methods for RegExp, Type conversion in JavaScript.	11
II	**Event handling**: JavaScript events, Event handler, Event flow, Event bubbling and capturing, Event listeners, Event types. **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	11
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. **Form Handling**: Introduction to forms, Form processing, Forms object, Accessing data from forms, Form validation, Additional features in forms, Validation APIs	12
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 • 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

	• 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: ➢ **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))**
Part C-Learning Resources		
Recommended 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 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

<table>
<tr><th colspan="5">Scheme: 2023-24, Syllabus: 2024-25</th></tr>
<tr><th colspan="5">Part A - Introduction</th></tr>
<tr><td>Subject</td><td colspan="4">B.Voc. (Software Development)</td></tr>
<tr><td>Semester</td><td colspan="4">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="4">Computer Networks</td></tr>
<tr><td>Course Code</td><td colspan="4">B23-CSD-403</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="4">CC-C4</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="4">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="4">Basic understanding of computer systems and programming.</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="4">After completing this course, the learner will be able to:
1. understand the fundamental concepts of computer networks.
2. learn about network protocols, architectures, and applications.
3. develop skills for designing and managing networks.
4. learn about network security and wireless networks.
5*. Understand the practical aspects of computer networks.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td><td></td></tr>
<tr><td>3</td><td>1</td><td>4</td><td></td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td><td></td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="3">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><th colspan="5">Part B- Contents of the Course</th></tr>
<tr><td colspan="5"><u>Instructions for Paper-Setter</u>
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.</td></tr>
</table>

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 Computer Networks: Overview of computer networks, types of networks (LAN, WAN, MAN), network topologies, and network models (OSI and TCP/IP). Physical Layer: Data transmission methods, signal encoding techniques, transmission media, and network devices (hubs, switches, routers).	11
II	Data Link Layer: Error detection and correction, flow control, MAC protocols, Ethernet, and switching. Network Layer: IP addressing and subnetting, routing algorithms, IPv4 vs. IPv6, and ARP.	11
III	Transport Layer: Transport layer protocols (TCP, UDP), congestion control, and quality of service (QoS). Application Layer: Application layer protocols (HTTP, FTP, DNS, SMTP), web services, and network applications.	11
IV	Network Security: Fundamentals of network security, cryptography, firewalls, VPNs, and intrusion detection systems (IDS). Wireless Networks: Wireless communication principles, Wi-Fi, Bluetooth, mobile networks, and ad hoc networks.	12
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • Setting up a basic LAN • Implementing error detection and correction algorithms. • Analyzing signal encoding techniques • Configuring routers and switches, subnetting exercises. • Implementing and analyzing TCP and UDP protocols. • Developing simple client-server applications. • Setting up and configuring firewalls and VPNs. • Setting up and securing a wireless network.	30

Suggested Evaluation Methods

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))**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross.
- "Computer Networks" by Andrew S. Tanenbaum and David J. Wetherall.
- "Data and Computer Communications" by William Stallings.
- "Network Security Essentials" by William Stallings.

*Applicable for courses having practical components.