

LESSON PLANS

OF

DEPARTMENT OF COMPUTER APPLICATIONS

(B.C.A)

UG/PG Courses

Odd Semester



2025-26

INDIRA GANDHI (PG) MAHILA MAHAVIDYALAYA

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Department of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Problem Solving through C

Dates: 22 July, 2025- 24 Nov, 2025

Semester: I

Course Code B23-CAP-101

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T) +20(P) =70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T) +10(P) =30 Marks

Unit	Topics	Contact Hours
Unit: 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(), putchar(), puts().	11
Unit: 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.	12
Unit: 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.	11
Unit: 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*	<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"> • 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 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 the 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 	30

	<ul style="list-style-type: none">• To demonstrate student structure to read & display records of n students• To demonstrate the difference between structure & union.	
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Text Books:

Sushil Goel Problem Solving through C Natraj Publication

E. Balagurusamy - *Programming in ANSI C***Course Outcomes:**

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, unions, etc. in C language.

Lesson Plan

SR. No	Date	Content Course	Practical
1	22 July -25July 2025	Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types,	To read the radius of a circle and to find the area and circumference
2	28 July - 2 August	Assignment Statement, Symbolic Constant. Input/output: Formatted I/O Function-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putchar(), puts().	To read three numbers and find the biggest of three
3	4 August -8 August	Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment	To check whether the number is prime or not
4	11 August - 14 August	Conditional Operators and Special Operators Operator Hierarchy	To read a number, find the sum of the digits, reverse the number, and check it for palindrome
5	18 August - 23August	else-if ladder, switch and break statement, goto statement, Looping Statements: for, while, and do while loop, jumps in loops.	To read numbers from the keyboard continuously till the user presses 999 to find the sum of only positive numbers
6	25 August -30 August	Arrays: One-dimensional arrays - Declaration, Initialization, and Memory representation; Two-Dimensional arrays -Declaration, Initialization and Memory representation.	To read the percentage of marks and to display an appropriate message (Demonstration of else-if ladder)
7	1 Sept. - 6 Sept.	Functions: definition, prototype, function call, passing arguments to a function: call by value; call by reference, recursive functions.	To find the roots of the quadratic equation To read marks scored by n students and find the average of marks (Demonstration of the single dimensional array)
8	8 Sept. - 13 Sept.	Strings: Declaration and Initialization, String I/O, Array of Strings, String Manipulation Functions: String Length, Copy, Compare, Concatenate, etc., Search for a Substring.	To remove Duplicate Elements in a single dimensional Array To perform addition and subtraction of Matrices To find the factorial of a number
9	15 Sept. - 20 Sept.	Pointers in C: Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers, and Arrays.	To generate Fibonacci series To remove Duplicate Elements in a single dimensional Array
10	22 Sept. - 27 Sept.	Pointers, and Arrays. User-defined data types: Structures - Definition, Advantages of Structure,	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
11	29 Sept.- 4 Oct.	declaring structure variables, accessing structure members, Structure members initialization, Array of Structures; Unions - Union definition; the difference between Structure and Union.	To read a string and to find the number of alphabets, digits, vowels, consonants, spaces, and special characters
12	6 Oct.- 11 Oct.	Revision	To Swap Two Numbers using Pointers
13	13 Oct.- 18 Oct.	Revision	To demonstrate student structure to read & display records of n students
14	27 Oct. - 1 Nov.	Revision	To demonstrate the difference between structure & union.
15	3 Nov. - 8Nov	Revision	Revision
16	10 Nov-15 Nov	Revision	Revision
17	17 Nov. – 22 Nov.	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of COMPUTER SCIENCE

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Foundations of Computer Science

Dates: 22 July, 2025- 24 Nov, 2025

Semester: I

Course Code B23-CAP-102

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T) +20(P) =70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T) +10(P) =30 Marks

Unit	Topics	Contact Hours
Unit: 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
Unit: 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
Unit: 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
Unit: IV	Threats: Physical & non-physical threats, Viruses, worms, Trojans, Spyware, Keyloggers, 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
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Operating System: Starting with basics of Operating Systems and its • functionalities Computer Basics: Identify the various computer hardware • Understanding the working of computer • Understanding various types of software • Internet and E-mail: Using Internet for various tasks • Creating and using e-mail. • Security: Understanding various threats • How to be safe from virus threats • Various software to get safe from virus attacks. •	30

Text Books:

Sushil Goel Foundations of Computer Science Natraj Publication

Peter Norton – Introduction to Computers

Course Outcomes:**After successfully completing this course, students will be able to:**

1. To understand the basic concepts of computers.
2. To learn about input/output (I/O) devices and operating systems.
3. To understand the Internet and its services.
4. To learn about threats and security concepts related to computers.
5. To understand the working of operating systems, the Internet, and computer security systems.

Lesson Plan

SR. No	Date	Course Content	Practical
1	22 July -25July 2025	Computer Fundamentals: Evolution of Computers through generations, Characteristics of Computers, Strengths and Limitations of Computers,:	To understand the basic working and functions of the Operating System.
2	28 July - 2 August	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	To identify different hardware parts of a computer.
3	4 August -8 August	Concept of bit, byte, word, nibble, storage locations, and addresses, measuring units of storage capacity, access time, the concept of the memory hierarchy.	To understand how a computer works.
4	11 August - 14 August	Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory.	To identify system and application software.
5	18 August - 23August	I/O Devices: I/O Ports of a Desktop Computer, Device Controller, Device	To use the Internet for searching information.
6	25 August -30 August	Input Devices: classification and use, keyboard, pointing devices - mouse, touchpad and trackball, joystick, magnetic stripes, scanner, digital camera, and microphone	To create and use an email account.
7	1 Sept. - 6 Sept.	Output Devices: speaker, monitor, printers: classification, laser, inkjet, dot-matrix. Plotter.	To identify security threats.
8	8 Sept. - 13 Sept.	Driver 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.	To understand virus protection.
9	15 Sept. - 20 Sept.	The Internet: Introduction to networks and Internet, history, Internet, Intranet & Extranet, Working of Internet,	To learn safe computing practices.
10	22 Sept. - 27 Sept.	Modes of Connecting to Internet. Electronic Mail: Introduction, advantages and disadvantages,	Revision
11	29 Sept.- 4 Oct.	User IDs, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.	Revision
12	6 Oct.- 11 Oct.	Threats: Physical & non-physical threats, Viruses, worms, Trojans, Spyware, Keyloggers, Rootkits, Adware, Cookies,	Revision
13	13 Oct.- 18 Oct.	Phishing, Hacking, Cracking. Computer Security Fundamentals: Confidentiality, Integrity, Authentication, Non-Repudiation, Security Mechanisms,	Revision
14	27 Oct. - 1 Nov.	Security Awareness, Security Policy, anti-virus software & Firewalls, backup & recovery.	Revision
15	3 Nov. - 8Nov	Revision	Revision
16	10 Nov-15 Nov	Revision	Revision
17	16 Nov- 22 Nov.	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

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Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Logical Organization of Computer

Dates: 22 July, 2025- 24 Nov, 2025

Semester: I

Course Code B23-CAP-103

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T) +20(P) =70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T) +10(P) =30 Marks

Unit	Topics	Contact Hours
Unit: 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
Unit: II	Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Complement 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, Karnaugh-Maps (upto four variables), Handling Don't Care conditions.	11
Unit: III	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR, etc. Their symbols, truth tables, and Boolean expressions. Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	11
Unit: IV	Sequential Circuits: Basic Flip-Flops and their working. Synchronous and Asynchronous Flip-Flops, Triggering of Flip-Flops, Clocked RS, D Type, JK, T type, and Master-Slave Flip-Flops. State Table, State Diagram, and State Equations. Flip-flops characteristics & Excitation Tables. Sequential Circuits: Designing registers –Serial-In Serial-Out (SISO), Serial-In Parallel-Out (SIPO), Parallel-In Serial-Out (PISO) Parallel-In Parallel-Out (PIPO) and shift registers.	12
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. <ul style="list-style-type: none">• 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

Text Books:

Sushil Goel Logical Organization of Computers Natraj Publication

Course Outcomes:

After successfully completing this course, students will be able to:

1. Understand number systems, error-detecting and error-correcting codes, and the representation of numbers in a computer system.
2. Understand computer arithmetic, Boolean algebra, and the simplification of Boolean expressions.
3. Understand the working of logic gates and design various combinational circuits using these gates.
4. Understand the working of different types of flip-flops and design various types of registers.
5. Understand the practical aspects of the logical organization of computers.

Lesson Plan

SR. No	Date	Course Content	Practical
1	22 July -25July 2025	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	To convert numbers from one number system to another.
2	28 July - 2 August	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.	To write a program to convert decimal to binary.
3	4 August -8 August	Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Compliment representations, Addition and subtraction with BCD representations.	To perform binary addition and subtraction.
4	11 August - 14 August	Boolean Algebra: Boolean Algebra Postulates, basic Boolean Theorems, Boolean Expressions, Boolean Functions, Truth Tables, Canonical Representation of Boolean Expressions: SOP and POS	To write a program for binary addition.
5	18 August - 23August	Simplification of Boolean Expressions using Boolean Postulates & Theorems, Karnaugh-Maps (upto four variables), Handling Don't Care conditions.	To simplify Boolean expressions using laws.
6	25 August -30 August	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR, etc. Their symbols, truth tables, and Boolean expressions	To study AND, OR, NOT, NAND, NOR, XOR gates.
7	1 Sept. - 6 Sept.	Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	To design a Half Adder.
8	8 Sept. - 13 Sept.	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR, etc. Their symbols, truth tables, and Boolean expressions.	To design a Full Adder using logic gates.
9	15 Sept. - 20 Sept.	Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtractor,	To study SR, JK, D, and T Flip-Flops.
10	22 Sept. - 27 Sept.	Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	To study Shift Registers. Types SISO, SIPO, PISO, PIPO
11	29 Sept.- 4 Oct.	Sequential Circuits: Basic Flip-Flops and their working. Synchronous and Asynchronous Flip-Flops,	Revision
12	6 Oct.- 11 Oct.	Triggering of Flip- Flops, Clocked RS, D Type, JK, T type, and Master-Slave Flip-Flops.	Revision
13	13 Oct.- 18 Oct.	Revision	Revision
14	27 Oct. - 1 Nov.	Revision	Revision
15	3 Nov. - 8Nov	State Table, State Diagram, and State Equations. Flip-flops characteristics & Excitation Tables. Sequential Circuits: Designing registers –Serial-In Serial-Out (SISO),	Revision
16	10 Nov-15 Nov	Serial-In Parallel-Out (SIPO), Parallel-In Serial-Out (PISO) Parallel-In Parallel-Out (PIPO) and shift registers.	Revision
17	17 Nov -22 Nov	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Java OOP Foundations

Dates: 22 July, 2025- 24 Nov, 2025

Semester: **III**

Course Code B23-CAP-301

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T) +20(P) =70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T) +10(P) =30 Marks

Unit	Topics	Contact Hours
Unit: I	Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs.	11
Unit: 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
Unit: 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
Unit: 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*	<ul style="list-style-type: none">• Aim: To write a Java program to find the sum of 10 numbers using command-line arguments.• Aim: To find the area of rectangle and circle using an interface.• Aim: To implement multiple inheritance using interfaces.• Aim: To demonstrate the use of packages in Java.• Aim: To handle exceptions using try, multiple catch, and finally blocks.• Aim: To design a Calculator Applet using Layout Managers.• Aim: To add two integers using text boxes and display result in a third box.• Aim: To calculate Sum, Multiplication, and Average of three numbers using AWT.• Aim: To display mouse activities using MouseListener and MouseMotionListener.• Aim: To read characters from one file and write into another file.• Aim: To display even numbers in T1 and odd numbers in T2 using AWT.• Aim: To copy data from one file to another using byte stream.	30

Text Books :

Sushil Goel JAVA OOPS Foundations Natraj Publication

Herbert Schildt – Java: The Complete Reference TATA MCGRAW HILL

Course Outcomes :

After successfully completing this course, students 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-based applications.

Lesson Plan

SR · No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Object Oriented Programming and Java Fundamentals	Aim: To write a Java program to find the sum of 10 numbers using command-line arguments.
2	28 July - 2 August	Structure of Java programs	Aim: To find the area of rectangle and circle using an interface.
3	4 August -8 August	Classes and Objects, Data types	Aim: To implement multiple inheritance using interfaces.
4	11 August - 14 August	Type Casting, Looping Constructs.	Aim: To demonstrate the use of packages in Java.
5	18 August - 23August	Interfaces: Interface basics; Defining, implementing, and extending interfaces;	Aim: To handle exceptions using try, multiple catch, and finally blocks.
6	25 August -30 August	Implementing multiple inheritance using interfaces	Aim: To design a Calculator Applet using Layout Managers.
7	1 Sept. - 6 Sept.	Packages: Basics of packages, Creating and accessing packages, System packages, Creating user-defined packages	Aim: To add two integers using text boxes and display result in a third box.
8	8 Sept. - 13 Sept.	Exception handling using the main keywords of exception handling	Aim: To calculate Sum, Multiplication, and Average of three numbers using AWT.
9	15 Sept. - 20 Sept.	try, catch, throw, throws, and finally; Nested try, multiple catch statements	Aim: To display mouse activities using MouseListener and MouseMotionListener.
10	22 Sept. - 27 Sept.	Nested try, multiple catch statements, creating user-defined exceptions	Aim: To read characters from one file and write into another file.
11	29 Sept.- 4 Oct.	creating user-defined exceptions. File Handling Byte Stream, Character Stream, File I/O Basics, File Operations	Aim: To display even numbers in T1 and odd numbers in T2 using AWT.
12	6 Oct.- 11 Oct.	AWT and Event Handling: The AWT	Aim: To copy data from one file to another using byte stream.
13	13 Oct.- 18 Oct.	class hierarchy, Events, Event sources,	Revision
14	27 Oct. - 1 Nov.	Event classes	Revision
15	3 Nov. - 8Nov	Revision	Revision
16	10 Nov-15 Nov	Event Listeners, Relationship between Event sources and Listeners	Revision
17	17 Nov -22 Nov	Delegation event model, Creating GUI applications using AWT.	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA ,KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Linux & Shell Programming

Dates: 22 July, 2025- 24 Nov, 2025

Semester: **III**

Course Code B23-CAP-302

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T)+20(P)=70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T)+10(P)=30 Marks

Unit	Topics	Contact Hours
Unit: 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
Unit: 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
Unit: 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
Unit: 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">• To learn and use basic Linux commands for file and system management.• To write and execute basic shell programs such as Fibonacci series, factorial, and Armstrong number.• To design an arithmetic calculator using shell scripting.• To generate multiplication tables using shell programs.• To perform base conversions such as Decimal to Binary and Binary to Decimal.• To retrieve information about login names and file details.• To write shell scripts to exchange the contents of two variables.• To write shell scripts to calculate student results based on marks.• To develop shell programs for calculating the area of square, rectangle, circle, and triangle.• To write shell scripts to print numbers from 1 to 20.	30

Text Books :

1. Sushil Goel Linux & Shell Programming Natraj Publication

2. Sumitabha Das – Your Unix: The Ultimate Guide By Tata Mcgraw Hills

Course Outcomes :

By the end of this course, students will be able to:

1. Understand the Linux architecture.
2. Use various Linux commands to perform and manage system operations.
3. Acquire knowledge of the Linux file system.
4. Understand and effectively use input/output and shell scripting to solve problems.
5. Implement programs based on various shell commands and scripts in Linux.

Lesson Plan

SR. No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Introduction to Linux: Linux distributions, Overview of Linux operating system, Linux architecture,	To learn and use basic Linux commands for file and system management.
2	28 July - 2 August	Features of Linux, Accessing Linux system, Starting and shutting down system	To write and execute basic shell programs such as Fibonacci series, factorial, and Armstrong number.
3	4 August -8 August	Logging in and Logging out, Comparison of Linux with other operating systems.	To design an arithmetic calculator using shell scripting.
4	11 August - 14 August	Commands in Linux: General-purpose commands, File oriented commands, directory-oriented commands	To generate multiplication tables using shell programs.
5	18 August - 23August	Communication-oriented commands, process-oriented commands, etc	To perform base conversions such as Decimal to Binary and Binary to Decimal.
6	25 August -30 August	Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, grep; Introducing regular expressions.	To retrieve information about login names and file details.
7	1 Sept. - 6 Sept.	Linux file system: Linux files, inodes and structure and file system, file system components, standard file system	To write shell scripts to exchange the contents of two variables.
8	8 Sept. - 13 Sept.	file system types. Processes in Linux: Starting and Stopping Processes	To write shell scripts to calculate student results based on marks.
9	15 Sept. - 20 Sept.	Initialization Processes, Mechanism of process creation, and Job control in Linux using at, batch, cron & time.	To develop shell programs for calculating the area of square, rectangle, circle, and triangle.
10	22 Sept. - 27 Sept.	Shell Programming: vi editor, shell variables, I/O in shell, control structures	To write shell scripts to print numbers from 1 to 20.
11	29 Sept.- 4 Oct.	Loops,	Revision
12	6 Oct.- 11 Oct.	Subprograms, creating & executing shell scripts in Linux.	Revision
13	13 Oct.- 18 Oct.	Revision	Revision
14	27 Oct. - 1 Nov.	Revision	Revision
15	3 Nov. - 8Nov	Revision	Revision
16	10 Nov-15 Nov	Revision	Revision
17	17 Nov- 22 Nov	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Database Technologies

Dates: 22 July, 2025- 24 Nov, 2025

Semester: **III**

Course Code B23-CAP-303

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T) +20(P) =70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T) +10(P) =30 Marks

Unit	Topics	Contact Hours
Unit: 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
Unit: 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
Unit: III	SQL: Meaning, Purpose, and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries. Constraints and its Implementation in SQL. Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product, etc. Relational Calculus: Tuple Relational and Domain Relational Calculus.	12
Unit: 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, 11 23 Domain Key Normal Form.	11
V*	Programming Lab Activities The following activities will be carried out and discussed in the laboratory during the semester: <ul style="list-style-type: none">• Performing various SQL statements, creating different tables, and executing all possible queries based on the syllabus.• Understanding the concepts of the relational data model.• Understanding the process of normalization in databases.• Understanding various fundamental concepts of database systems.	30

Text Books : Sushil Goel Database Technologies Natraj Publication

1. Database System Concepts – Abraham Silberschatz, Henry Korth, S. Sudarshan By Pearson

2. Fundamentals of Database Systems – Ramez Elmasri & Shamkant Navathe By Pearson

Course Outcomes:

After successfully completing this course, students will be able to

1. Understand the concepts of databases and their architecture.
2. Understand the various types of data models.
3. Understand the concepts of SQL and relational algebra.
4. Understand the relational model and normalization in detail.
5. Implement various SQL queries.

Lesson Plan

SR · No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Basic Concepts – Data, Information, Records, Files, Schema and Instance etc. Limitations of File-Based Approach, Characteristics of Database Approach, Database Management System (DBMS)	Study of Basic SQL Commands
2	28 July - 2 August	Components of DBMS Environment, DBMS Functions and Components, Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator	Creation of Database and Tables
3	4 August -8 August	Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc	Performing SQL Queries
4	11 August - 14 August	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.	Implementation of Constraints
5	18 August - 23August	Data Models: Hierarchical, Network, and Relational Data Models. Entity-Relationship Model: Entity, Entity Sets, Entity Type,	Study of Relational Model
6	25 August -30 August	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,	Implementation of SQL Joins
7	1 Sept. - 6 Sept.	SQL: Meaning, Purpose, and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries. Constraints and its Implementation in SQL	Use of Aggregate Functions
8	8 Sept. - 13 Sept.	Join Operations and Sub-queries. Constraints and its Implementation in SQL.	Normalization of Tables (1NF, 2NF, 3NF)
9	15 Sept. - 20 Sept.	Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product, etc. Relational Calculus: Tuple Relational and Domain Relational Calculus.	Implementation of Subqueries
10	22 Sept. - 27 Sept.	Relational Model: Functional Dependency, Characteristics, Inference Rules for Functional Dependency	Creation and Use of Views
11	29 Sept.- 4 Oct.	Types of Functional Dependency, Normalization: Benefits and Need of Normalization	Database Security and User Privileges
12	6 Oct.- 11 Oct.	Normalization: Benefits and Need of Normalization, Normal Forms Based on Primary Keys- (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies	Database Backup and Recovery
13	13 Oct.- 18 Oct.	Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, 11 23 Domain Key Normal Form.	Revision
14	27 Oct. - 1 Nov.	Revision	Revision
15	3 Nov. - 8Nov	Revision	Revision
16	10 Nov-15 Nov	Revision	Revision
17	17 Nov- 22 Nov	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Name of the Course: Data Science Using Excel

Dates: 22 July, 2025- 24 Nov, 2025

Semester: **III**

Course Code: B23-CAP-304

SYLLABUS

Maximum Marks: 100

End Term Exam Marks: 50(T) +20(P) =70 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Time: 3 hours

Assessment: 20(T) +10(P) =30 Marks

Unit	Topics	Contact Hours
Unit: I	Introduction to Data Science: Definition, importance, and applications. Overview of Excel: Interface, basic functions, and features. Data Types and Formats in Excel: Text, numbers, dates, and custom formats. Basic Data Manipulation: Sorting, filtering, and basic formulas (SUM, AVERAGE, COUNT).	10
Unit: II	Data Import and Export: CSV, TXT, and Excel files. Data Cleaning Techniques: Handling missing values, duplicates, and errors. Data Transformation: Text-to-columns, concatenation, and data validation. Data Visualization: Creating and customizing charts (bar, line, pie).	10
Unit: III	Descriptive Statistics: Mean, median, mode, standard deviation, and variance. Inferential Statistics: Hypothesis testing, t-tests, and chi-square tests. Regression Analysis: Simple linear regression and multiple regression. Predictive Modeling: Introduction to basic predictive models and their implementation in Excel.	10
Unit: IV	Advanced Excel Functions: VLOOKUP, HLOOKUP, INDEX MATCH, and PivotTables. Data Analysis ToolPak: Using Excel's built-in data analysis tools such as Descriptive Statistics, Histograms, Correlation, and Regression. What-If Analysis Tools: Scenario Manager, Goal Seek, and Data Tables.	10
V*	During the semester, students will: <ul style="list-style-type: none">• Learn the Excel interface, including ribbons, toolbars, and basic operations such as data entry, formatting, and calculations.• Create simple spreadsheets and apply basic Excel functions.• Import data from CSV and text files and perform data cleaning by handling missing values, removing duplicates, and correcting errors.• Sort and filter data to analyze and extract useful information.• Use formulas and functions for data transformation, including text, date, and mathematical functions.• Calculate and interpret descriptive statistics such as mean, median, mode, range, variance, and standard deviation.• Apply conditional formulas and conditional formatting to analyze and highlight data trends.• Create and customize charts and graphs for visual data analysis.• Use PivotTables to summarize, group, and analyze data interactively.• Apply lookup and reference functions such as VLOOKUP, HLOOKUP, INDEX, and MATCH.• Perform statistical analysis using the Data Analysis Toolpak, including regression and ANOVA.	25

Text Books:

Sushil Goel Data Science Using Excel Natraj Publication

Course Outcomes:

After successfully completing this course, students will be able to

By the end of this course, students will be able to:

1. Understand the fundamental concepts of data science and the role of Excel in data analysis.
2. Perform data cleaning, preparation, and visualization using Excel.
3. Apply statistical analysis and basic predictive modeling using Excel.
4. Use advanced Excel functions and data analysis tools.
5. Implement various Excel functions for data anal

Lesson Plan

SR · No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Introduction to Data Science: Definition, importance, and applications. Overview of Excel: Interface, basic functions, and features	Learn the Excel interface, including ribbons, toolbars, and basic operations such as data entry, formatting, and calculations.
2	28 July - 2 August	Data Types and Formats in Excel: Text, numbers, dates, and custom formats.	Create simple spreadsheets and apply basic Excel functions.
3	4 August -8 August	Basic Data Manipulation: Sorting, filtering, and basic formulas (SUM, AVERAGE, COUNT).	Import data from CSV and text files and perform data cleaning by handling missing values, removing duplicates, and correcting errors.
4	11 August - 14 August	Data Import and Export: CSV, TXT, and Excel files	Sort and filter data to analyze and extract useful information.
5	18 August - 23August	Data Cleaning Techniques: Handling missing values, duplicates, and errors.	Use formulas and functions for data transformation, including text, date, and mathematical functions.
6	25 August -30 August	Data Transformation: Text-to-columns, concatenation, and data validation.	Calculate and interpret descriptive statistics such as mean, median, mode, range, variance, and standard deviation.
7	1 Sept. - 6 Sept.	Data Visualization: Creating and customizing charts (bar, line, pie).	Apply conditional formulas and conditional formatting to analyze and highlight data trends.
8	8 Sept. - 13 Sept.	Descriptive Statistics: Mean, median, mode, standard deviation, and variance.	Create and customize charts and graphs for visual data analysis.
9	15 Sept. - 20 Sept.	Statistics: Hypothesis testing, t-tests, and chi-square tests.	Use PivotTables to summarize, group, and analyze data interactively.
10	22 Sept. - 27 Sept.	Regression Analysis: Simple linear regression and multiple regression.	Apply lookup and reference functions such as VLOOKUP, HLOOKUP, INDEX, and MATCH.
11	29 Sept.- 4 Oct.	Predictive Modeling: Introduction to basic predictive models and their implementation in Excel.	Perform statistical analysis using the Data Analysis Toolpak, including regression and ANOVA.
12	6 Oct.- 11 Oct.	Advanced Excel Functions: VLOOKUP, HLOOKUP, INDEX MATCH, and PivotTables	Revision
13	13 Oct.- 18 Oct.	Data Analysis ToolPak: Using Excel's built-in data analysis tools such as Descriptive Statistics,	Revision
14	27 Oct. - 1 Nov.	Histograms, Correlation, and Regression	Revision
15	3 Nov. - 8Nov	What-If Analysis Tools: Scenario Manager, Goal Seek, and Data Tables.	Revision
16	10 Nov-15 Nov	Revision	Revision
17	17 Nov- 22 Nov	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Semester: V

Name of the Course: Software Engineering

Course Code: B23-CAP-501

Dates: 22 July, 2025- 24 Nov, 2025

SYLLABUS

Maximum Marks: 100

Time: 3 hours

End Term Exam Marks: 50(T) +20(P) =70 Marks

Assessment: 20(T) +10(P) =30 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
Unit: I	Introduction: Program vs. Software, Software Engineering, Programming paradigms, Software Crisis – problem and causes, Phases in Software development: Requirement Analysis, Software Design, Coding, Testing, Maintenance, Software Development Process Models: Waterfall, Prototype, Evolutionary and Spiral models, Role of Metrics.	11
Unit: II	Feasibility Study, Software Requirement Analysis and Specifications: SRS, Need for SRS, Characteristics of an SRS, Components of an SRS, Problem Analysis, Information gathering tools, Requirement specification, validation and metrics. Structured Analysis and Tools: Data Flow Diagram, Data Dictionary, Decision table, Decision trees, Structured English, Entity-Relationship diagrams	11
Unit: III	Software Project Planning: Cost estimation: COCOMO model, Project scheduling, Staffing, and personnel planning, team structure, Software configuration management, Quality assurance plans, Project monitoring plans, Risk Management. Software Design: Design fundamentals, problem partitioning, and abstraction, design methodology, Cohesion & Coupling.	12
Unit: IV	Software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing. Software Maintenance: Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.	11
V*	During the semester, students will practice: <ul style="list-style-type: none">• Developing Data Flow Diagrams (DFD) including 0-level, 1-level, and 2-level DFD.• Preparing a Data Dictionary.• Designing Entity Relationship (ER) Diagrams for:<ul style="list-style-type: none">○ Student–Teacher system○ Library Management System○ Hospital Management System• Designing ER diagrams for various real-world systems such as:<ul style="list-style-type: none">○ Student Result System○ Inventory Control○ Accounting System○ Bank Loan System○ Railway Reservation System○ ATM○ Hotel, Hostel, and Resource Management Systems○ Blood Bank, Court Case, E-Ticketing, Online Trading, etc	30

Text Books: Sushil Goel Software Engineering Natraj Publications

Course Outcomes:

After successfully completing this course, students will be able to

By the end of this course, students will be able to:

1. Learn the various models used for software development.
2. Understand how to analyze software requirements.
3. Plan and design software while managing associated risks.
4. Test and validate software systems.
5. Implement various tools and techniques used in software engineering.

Lesson Plan

SR · No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Students doing their Internship	----
2	28 July - 2 August	Students doing their Internship	----
3	4 August -8 August	Introduction: Program vs. Software, Software Engineering,	0-Level Data Flow Diagram (DFD)
4	11 August - 14 August	Software Crisis – problem and causes, Phases in Software development: Requirement Analysis,	1-Level Data Flow Diagram
5	18 August - 23August	Software Design, Coding, Testing, Maintenance, Software Development	2-Level Data Flow Diagram
6	25 August -30 August	Programming paradigms, Process Models: Waterfall, Prototype, Evolutionary and Spiral models, Role of Metrics.	Data Dictionary
7	1 Sept. - 6 Sept.	Feasibility Study, Software Requirement Analysis and Specifications:	ER Diagram – Student–Teacher System
8	8 Sept. - 13 Sept.	Need for SRS, Characteristics of an SRS, Components of an SRS, Problem Analysis, Information gathering tools,	ER Diagram – Library Management System
9	15 Sept. - 20 Sept.	Requirement specification, validation and metrics. Structured Analysis and Tools: Data Flow Diagram, Data Dictionary	ER Diagram – Hospital Management System
10	22 Sept. - 27 Sept.	SRS, Decision table, Decision trees, Structured English, Entity-Relationship diagrams	ER Diagram – Student Result Management System
11	29 Sept.- 4 Oct.	Software Project Planning: Cost estimation: COCOMO model, Project scheduling	ER Diagram – Inventory Control System
12	6 Oct.- 11 Oct.	Staffing, and personnel planning, team structure, Software configuration management	ER Diagram – Accounting System ER Diagram – Bank Loan System
13	13 Oct.- 18 Oct.	Quality assurance plans, Project monitoring plans, Risk Management	ER Diagram – Railway Reservation System ER Diagram – Automatic Teller Machine (ATM)
14	27 Oct. - 1 Nov.	Software Design: Design fundamentals, problem partitioning, and abstraction, design methodology, Cohesion & Coupling.	ER Diagram – Hotel / Hostel Management System
15	3 Nov. - 8Nov	Software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing.	ER Diagram – Blood Bank / Court Case / E-Ticketing / Online Trading System
16	10 Nov-15 Nov	Software Maintenance: Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.	Revision
17	17 Nov- 22 Nov	Revision	Revision
18	24 Nov.	Revision	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Semester: V

Name of the Course: Backend Web Development

Course Code: B23-CAP-502

Dates: 22 July, 2025- 24 Nov, 2025

SYLLABUS

Maximum Marks: 100

Time: 3 hours

End Term Exam Marks: 50(T) +20(P) =70 Marks

Assessment: 20(T) +10(P) =30 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
Unit: I	Introduction to back-end Development: Overview of backend, Client-server architecture, Introduction to web servers and database Programming Languages and Tools: Introduction to server-side languages (e.g., Node.js), Syntax and semantics of chosen server-side language	11
Unit: II	Programming Languages: Version control with Git, Introduction to IDEs (Integrated Development Environments) of chosen language, Writing and executing basic server-side scripts Performance Optimization and Security: Caching strategies, Query optimization	11
Unit: III	Database Management: Introduction to databases and DBMS (SQL and NoSQL), Designing a database schema, CRUD operations (Create, Read, Update, Delete), Connecting applications to a database	11
Unit: IV	Server-Side Frameworks: Overview of popular server-side frameworks (e.g., Express.js), Building a simple application using a framework API Development: RESTful API concepts, Designing and documenting APIs, Authentication and authorization basics, Web security best practices (SQL injection, XSS, CSRF)	12
V*	During the initial period of the semester, students will: <ul style="list-style-type: none">Set up the backend development environment using tools such as IDEs and Git, and create a basic “Hello World” application using Node.js.Work with SQL databases (MySQL/PostgreSQL) by performing CRUD operations using SQL queries.Learn NoSQL databases by setting up MongoDB and implementing CRUD operations.Design and develop RESTful APIs, including endpoints for CRUD operations and basic authentication and authorization.Gain hands-on experience with backend frameworks such as Node.js and Express.js by building simple web applications.Integrate frontend and backend by creating APIs that serve JSON data and developing a simple frontend using HTML, CSS, and JavaScript.Implement data validation and error handling using middleware and exception-handling techniques.Apply security best practices, including HTTPS/SSL configuration and protection against common vulnerabilities such as SQL injection and XSS.	30

Text Books:

Sushil Goel Backend Web Development Natraj Publications

Course Outcomes:

After successfully completing this course, students will be able to

By the end of this course, students will be able to:

1. Understand the principles of back-end development.
2. Use back-end programming languages and frameworks effectively.
3. Design and manage databases.
4. Develop and use back-end applications.
5. Gain practical knowledge of back-end programming.

Lesson Plan

SR No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Students doing their internship	-----
2	28 July - 2 August	Students doing their internship	-----
3	4 August -8 August	Introduction to back-end Development	Set up the backend development environment using tools such as IDEs and Git, and create a basic “Hello World” application using Node.js.
4	11 August - 14 August	Overview of backend, Client-server architecture, Introduction to web servers and database	Work with SQL databases (MySQL/PostgreSQL) by performing CRUD operations using SQL queries.
5	18 August - 23August	Programming Languages and Tools	Learn NoSQL databases by setting up MongoDB and implementing CRUD operations
6	25 August -30 August	Introduction to server-side languages (e.g., Node.js)	Design and develop RESTful APIs , including endpoints for CRUD operations and basic authentication and authorization.
7	1 Sept. - 6 Sept.	Syntax and semantics of chosen server-side language	Gain hands-on experience with backend frameworks such as Node.js and Express.js by building simple web applications.
8	8 Sept. - 13 Sept.	Programming Languages	Integrate frontend and backend by creating APIs that serve JSON data and developing a simple frontend using HTML, CSS, and JavaScript.
9	15 Sept. - 20 Sept.	Version control with Git, Introduction to IDEs (Integrated Development Environments) of chosen language,	Implement data validation and error handling using middleware and exception-handling techniques.
10	22 Sept. - 27 Sept.	Writing and executing basic server-side scripts	Apply security best practices , including HTTPS/SSL configuration and protection against common vulnerabilities such as SQL injection and XSS.
11	29 Sept.- 4 Oct.	Performance Optimization and Security: Caching strategies, Query optimization	Revision
12	6 Oct.- 11 Oct.	Database Management: Introduction to databases and DBMS (SQL and NoSQL)	Revision
13	13 Oct.- 18 Oct.	Designing a database schema, CRUD operations (Create, Read, Update, Delete)	Revision
14	27 Oct. - 1 Nov.	Connecting applications to a database	Revision
15	3 Nov. - 8Nov	Server-Side Frameworks: Overview of popular server-side frameworks (e.g., Express.js), Building a simple application using a framework	Revision
16	10 Nov-15 Nov	API Development: RESTful API concepts	Revision
17	17 Nov- 22 Nov	Designing and documenting APIs, Authentication and authorization basics	Revision
18	24 Nov.	Web security best practices (SQL injection, XSS, CSRF)	Revision

Signature of Teacher

Head of Department

INDIRA GANDHI (P.G.) MAHILA MAHAVIDYALAYA, KAITHAL

Affiliated to Kurukshetra University, Kurukshetra

Department Of Computer Science

Lesson Plan (Session 2025-2026)

Class: BCA

Semester: V

Name of the Course: Network Infrastructure & Data Communication Technologies

Course Code: B23-CAP-503

Dates: 22 July, 2025- 24 Nov, 2025

SYLLABUS

Maximum Marks: 100

Time: 3 hours

End Term Exam Marks: 50(T) +20(P) =70 Marks

Assessment: 20(T) +10(P) =30 Marks

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of short type question covering the entire syllabus in addition to that eight more questions will be set, two question from each unit. Students will be required to attempt in all. In addition to the compulsory question, student will have to attempt four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
Unit: I	Introduction to Data Communication and Computer Networks; Uses of Computer Networks; Types of Computer Networks and their Topologies; Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways; Network Software: Network Design issues and Protocols; Connection Oriented and Connectionless Services; OSI Reference Model; TCP/IP Model	11
Unit: II	Analog and Digital Communications Concepts: Analog and Digital data and signals; Bandwidth and Data Rate, Capacity, Baud Rate; Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Modems and modulation techniques	11
Unit: III	Data Link Layer Design issues; Error Detection and Correction methods; Sliding Window Protocols: One-bit, Go Back N, and Selective Repeat; Media Access Control: ALOHA, Slotted ALOHA, CSMA, Collision free protocols; Introduction to LAN technologies: Ethernet, Switched Ethernet, Fast Ethernet, Gigabit Ethernet; Token Ring; Introduction to Wireless LANs and Bluetooth;	11
Unit: IV	Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, Hierarchical Routing; Congestion Control; Traffic shaping; Choke packets; Load shedding; Application Layer: Introduction to DNS, E-Mail, and WWW services; Network Security Issues: Security attacks; Encryption methods; Firewalls; Digital Signatures;	12
V*	During the semester, students will: <ul style="list-style-type: none">• Study different types of network cables and practically create cross-wired and straight-through cables using a crimping tool.• Learn about various network devices such as hubs, switches, routers, and LAN adapters.• Understand IP addressing and basic network concepts.• Connect computers to form a Local Area Network (LAN).• Perform initial configuration of switches and routers.• Study the components and specifications of laptops and desktop computers.• Become familiar with networking components, transmission media, and tools such as UTP and coaxial cables, connectors, and crimping tools.• Learn about routing protocols, both interior and exterior.• Study and create different LAN topologies using networking devices and cables.• Configure TCP/IP protocols in Windows and Linux environments.	30

Text Books:

Sushil Goel Network Infrastructure & Data Communication Technologies **Natraj Publications**

Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill.

Course Outcomes:

After successfully completing this course, students will be able to

By the end of this course, students will be able to:

1. Understand the basic concepts and principles of computer networks.
2. Describe analog and digital communication concepts.
3. Evaluate data link layer designs and LAN technologies.
4. Analyze routing algorithms and understand application layer concepts.
5. Use networking infrastructure and its applications effectively.

Lesson Plan

SR · No	Date	Course Content	
		Theory	Practical
1	22 July -25July 2025	Students doing their internship	-----
2	28 July - 2 August	Students doing their internship	-----
3	4 August -8 August	Introduction to Data Communication and Computer Networks; Uses of Computer Networks	Study different types of network cables and practically create cross-wired and straight-through cables using a crimping tool.
4	11 August - 14 August	Types of Computer Networks and their Topologies	Learn about various network devices such as hubs, switches, routers, and LAN adapters.
5	18 August - 23August	Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs	Understand IP addressing and basic network concepts.
6	25 August -30 August	Network Interface Cards and PC Cards, Bridges, Switches, Routers	Connect computers to form a Local Area Network (LAN) .
7	1 Sept. - 6 Sept.	Gateways; Network Software: Network Design issues and Protocols;	Connect computers to form a Local Area Network (LAN) .
8	8 Sept. - 13 Sept.	Connection Oriented and Connectionless Services;	Perform initial configuration of switches and routers .
9	15 Sept. - 20 Sept.	OSI Reference Model; TCP/IP Model	Study the components and specifications of laptops and desktop computers.
10	22 Sept. - 27 Sept.	Analog and Digital Communications Concepts: Analog and Digital data and signals;	Become familiar with networking components, transmission media, and tools such as UTP and coaxial cables, connectors, and crimping tools.
11	29 Sept.- 4 Oct.	Bandwidth and Data Rate, Capacity, Baud Rate	Learn about routing protocols , both interior and exterior.
12	6 Oct.- 11 Oct.	Guided and Wireless Transmission Media; Communication Satellites	Study and create different LAN topologies using networking devices and cables.
13	13 Oct.- 18 Oct.	Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Modems and modulation techniques	Configure TCP/IP protocols in Windows and Linux environments.
14	27 Oct. - 1 Nov.	Data Link Layer Design issues; Error Detection and Correction methods; Sliding Window Protocols	Revision
15	3 Nov. - 8Nov	One-bit, Go Back N, and Selective Repeat; Media Access Control: ALOHA, Slotted ALOHA, CSMA,	Revision
16	10 Nov-15 Nov	Collision free protocols; Introduction to LAN technologies: Ethernet, Switched Ethernet, Fast Ethernet, Gigabit Ethernet; Token Ring	Revision
17	17 Nov- 22 Nov	Token Ring; Introduction to Wireless LANs and Bluetooth; Hierarchical Routing; Congestion Control; Traffic shaping; Choke packets; Load shedding;	Revision
18	24 Nov.	Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing,Application Layer: Introduction to DNS, E-Mail, and WWW services; Network Security Issues: Security attacks; Encryption methods; Firewalls; Digital Signatures;	Revision

Signature of Teacher

Head of Department