

**Bachelor of Computer Applications (BCA)  
2022-23 & 2023-2024 Sessions**

**Fifth Semester**

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	External	Internal		
BCA-501	CC	Software Engineering	5	1	0	75	25	100	6
BCA-502	CC	Programming in Java	3	1	0	75	25	100	4
BCA-502(P)		Software Lab – IX	0	0	4	50	--	50	2
BCA-503	DSE	DSE - II*	4	0	4	75	25	100	6
BCA-504	CC	Information Security	5	1	0	75	25	100	6
BCA-505	GE	GE - III**	4	0	4	75	25	100	6
<b>Total</b>			<b>21</b>	<b>4</b>	<b>12</b>	<b>425</b>	<b>125</b>	<b>550</b>	<b>30</b>

**Discipline Specific Elective II:**

1	BCA-503 DSE1	Workshop on Python Programming
2	BCA-503 DSE2	Workshop on 'R' Programming.
3	BCA-503 DSE3	Internet of Things

**\*\*General Elective III:**

1	BCA-504 SEC1	Linux Operating System
2	BCA-504 SEC2	PC Assembly & Troubleshooting

**The breakup of marks for the continuous assessment for theory paper will be as under**

i	Two tests will be conducted during the semester. Both the tests will be considered for assessment.	:	50% of the marks allotted for continuous assessment
ii	Assignment / Presentations	:	20% of the marks allotted for continuous assessment
iii	Class participation & behaviour	:	10% of the marks allotted for continuous assessment
iv	Attendance	:	20% of the marks allotted for continuous assessment

Mr.Mukesh Kumar      Dr. Raman Maini      Dr.Sarabjeet Singh      Dr.Rajan Manro

Mr. Sandeep Sharma      Mr. Parduman Singh      Dr. Navdeep Singh      Dr. Harjeet Singh

Mr. Devinder Singh      Ms. HarsimratDeo      Ms. RituWalia      Ms. Devinder Kaur

Ms. Taranpreet Kaur      Dr. Sangeeta Joshi      Mr. Birinder Singh Sarao      Ms. Manpreet Kaur      Mr.Joga Singh

**Bachelor of Computer Applications (BCA)**  
**2022-23 & 2023-24 Sessions**

**Sixth Semester**

Course Code	Course Type	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			L	T	P	External	Internal		
BCA-601	DSE	DSE - III	3	1	0	75	25	100	4
BCA-601(P)		Software Lab – VIII	0	0	4	50	--	50	2
BCA-602	DSE	DSE - IV	3	1	0	75	25	100	4
BCA-602(P)		Software Lab – IX	0	0	4	50	--	50	2
BCA-603	GE	GE-IV	5	1	0	--	100	100	6
BCA-604	SEC	Minor Project	0	0	4	75	25	100	2
<b>Total</b>			<b>11</b>	<b>3</b>	<b>12</b>	<b>325</b>	<b>175</b>	<b>500</b>	<b>20</b>

**Discipline Specific Elective III:**

1	BCA-601 E1	Computer Graphics
2	BCA-601 E2	Machine Learning

**Discipline Specific Elective IV:**

1	BCA-602 E1	Web Development using ASP.NET
2	BCA-602 E2	Web Development using PHP
3	BCA-602 E3	Web Development using Node.js

**General Elective IV:**

1	BCA-603 E1	Quantitative and Logical Aptitude
2	BCA-603 E2	Personality Development with Presentation & Communication Skills.

**The breakup of marks for the continuous assessment for theory paper will be as under**

i	Two tests will be conducted during the semester. Both the tests will be considered for assessment.	:	50% of the marks allotted for continuous assessment
ii	Assignment / Presentations	:	20% of the marks allotted for continuous assessment
iii	Attendance, Class participation & behaviour	:	10% of the marks allotted for continuous assessment
iv	Attendance	:	20% of the marks allotted for continuous assessment

Mr.Mukesh Kumar      Dr. Raman Maini      Dr.Sarabeet Singh      Dr Rajan Manro

Mr. Sandeep Sharma      Mr. Parduman Singh      Dr. Navdeep Singh      Dr. Harjeet Singh

Mr. Devinder Singh      Ms. HarsimratDeo      Ms. RituWalia      Ms. Devinder Kaur

Ms. Taranpreet Kaur      Dr. Sangeeta Joshi      Mr. Birinder Singh Sarao      Ms. Manpreet Kaur      Mr.Joga Singh

**Semester V****Course Code:BCA-501****COURSE NAME:Software Engineering****Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- 1..Knowledge of basic Software engineering methods and practices and their appropriate application.
2. Describe software engineering layered technology and Process frame work.
3. A general understanding of software process models such as the waterfall and evolutionary models.

**Course Learning Outcomes**

- 1..An ability to identify, formulate, and solve complex problems.
2. Introduces the concept of coding and testing a software.
3. Familiarize the maintenance of the software.

**(A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

**(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**Unit I**

**Introduction:** The Problem Domain, Software Engg. Challenges, Software Engg. Approach. Software development life cycle, its phases, Software development process models :Waterfall, Prototyping, Iterative;

**Software Process:** Characteristics of software process, Project management process, Software configuration management process. Project Planning – activities, COCOMO model.

**Software Metrics:** Definition, Importance, Categories of metrics. Software Quality – Attributes, Cyclomatic complexity metric.

**Software Requirements Analysis:** Need for SRS, Data flow diagrams, Data Dictionary, entity relationship diagram, Characteristics and components of SRS, validation, metrics

**Unit II**

**Software Design:** Design principles, Module-level concepts, Structure Chart and Structured Design methodology, verification, metrics : network metrics, information flow metrics.

**Coding :** Programming Principles and Guidelines, Verification- code inspections, static analysis. **Software Testing:** testing fundamentals, Black Box Testing : Equivalence class partitioning, Boundary value analysis, cause-effect graphing; White Box Testing : Control flow and Data flow based testing, mutation testing; levels of testing, test plan, test case specification, test case execution and analysis,

**Software maintenance:** Categories of maintenance. Software Reliability – Definition, uses of reliability studies.

**Text Books:**

Board of Studies held on 19/04/2022

- 1..An Integrated approach to Software Engineering, Third Edition ,Pankaj Jalote, Narosa Publications.
2. Software Engineering , Revised Second Edition , K.K. Aggarwal, Yogesh Singh, New Age International Publishers.

**Reference Book:**

- 1..Software Engineering – A Practitioner’s Approach, Fifth Edition, Roger. S. Pressman, McGraw Hill

**Teaching Plan:**

Week	Content
1-2	<b>Introduction:</b> The Problem Domain, Software Engg. Challenges, Software Engg. Approach. Software development life cycle, its phases, Software development process models :Waterfall, Prototyping, Iterative.
3-4	<b>Software Process:</b> Characteristics of software process, Project management process, Software configuration management process. Project Planning – activities, COCOMO model.
5-6	<b>Software Metrics</b> – Definition, Importance, Categories of metrics. Software Quality – Attributes, Cyclomatic complexity metric.
7-8	<b>Software Requirements Analysis</b> – Need for SRS, Data flow diagrams, Data Dictionary, entity relationship diagram, Characteristics and components of SRS, validation, metrics
9-10	<b>Software Design:</b> Design principles, Module-level concepts, Structure Chart and Structured Design methodology, verification, metrics : network metrics, information flow metrics
11-12	<b>Coding :</b> Programming Principles and Guidelines, Verification- code inspections, static analysis.
13-14	<b>Control flow and Data flow based testing</b> , mutation testing; levels of testing, test plan, test case specification, test case execution and analysis, <b>Software maintenance:</b> Categories of maintenance. Software Reliability – Definition, uses of reliability studies.

**Semester V****Course Code:BCA-502****COURSE NAME:Programming in JAVA****Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java.
3. Define classes, invoking methods, using class libraries etc

**Course Outcomes:**

1. Students will be able to implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to particular problem.
3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.

**(A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three Units. Unit I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks each.

**(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**UNIT –I**

Introduction to Java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements. Operators and expressions: arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules. Control statements: if else, switch case, for, while, do while, break, continue, labeled loops. Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.

**UNIT –II**

Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments. Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication. Applets: Introduction, Applet Class, Applet Life Cycle, Graphics in Applet, Event-Handling. File and I/O Streams: File Class, Streams, Byte Streams, Filtered Byte Streams, Random Access File Class, Character Streams

**Text Book:**

1. Patrick Naughton and Herbert Schildt, “The Complete Reference Java 2”, TMH

**Reference Books:**

1. Horstmann, Cay S. and Gary Cornell, “Core Java
2. Fundamentals Vol. 1”, Pearson Education.
3. E. Balagurusamy “Programming with Java”, TMH

Board of Studies held on 19/04/2022

**Teaching Plan:**

Week	Content
1-2	Introduction to Java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements. Operators and expressions: arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise and special operators. Operator precedence & associativity rules.
3-4	Control statements: if else, switch case, for, while, do while, break, continue, labeled loops. Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods.
5-6	Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Arrays, Strings and Vectors, Packages and Interfaces, visibility controls
7-8	Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws.
9-10	Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication.
11-12	Applets: Introduction, Applet Class, Applet Life Cycle, Graphics in Applet, Event-Handling.
13-14	File and I/O Streams: File Class, Streams, Byte Streams, Filtered Byte Streams, Random Access File Class, Character Streams

**Semester V**  
**Course Code:BCA-502(P)**  
**COURSE NAME: Software Lab – IX**

**Maximum Marks: 50**

**External Examination: 50**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35%**

**Lectures to be delivered: 45-55 hrs**

**Objectives of the Subject:**

The objective of the course is to build software development skills using Java programming for real world applications.

**Course Outcome:** After Completion of the course the students will be able to:

- This course will teach the implementation of basic concepts and techniques which form
- the object oriented programming paradigm.
- Prepare students to be in a position to write object oriented programs using Java.
- To Build an application using user Interface Components.

**Implement programs in Java**

This laboratory course will comprise as exercises to supplement what is learnt under paper BCA-502.

Students are required to develop the following programs with internal documentation:

1. WAP to demonstrate the concept of class.
2. WAP that illustrates the use of constructor.
3. WAP for constructor overloading.
4. WAP for single inheritance using super keyword.
5. WAP for multilevel inheritance.
6. WAP to demonstrate method overriding.
7. WAP that implements multiple inheritance through interface.
8. WAP to demonstrate importing multiple packages.
9. WAP to demonstrate creating threads by extending Thread class.
10. WAP to demonstrate creating threads by implementing Runnable interface.
11. WAP that illustrates the use of exception handling.



**Semester-V**  
**Course Code:BCA-503 DSE1**  
**Course Name:Programming with Python**

**Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To understand why Python is a useful scripting language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To learn how to use indexing and slicing to access data in Python programs.
- To define the structure and components of a Python program.
- To learn how to write loops and decision statements in Python.
- To learn how to write functions and pass arguments in Python.
- To learn how to build and package Python modules for reusability.

**Course Outcomes: Students will be able to :**

- Explain environment, data types, operators used in Python.
- Compare Python with other programming languages.
- Outline the use of control structures and numerous native data types with their methods.
- Design user defined functions, modules, files, and packages and exception handling methods. CO5 Write solutions for Object Oriented Programming Concepts.

**Unit-I**

Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages. Python Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command. Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators. Control Structures: Decision making statements, Python loops, Python control statements. Python Native Data Types: Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations).

**Unit-II**

Python Functions: Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables. Python Modules: Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, Standard Modules, Python Packages. Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python. File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files in Python, directories in Python. Classes and Objects: The concept of OOPS in Python, Designing classes, Creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.

**References:**

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. How to think like a computer scientist : learning with Python / Allen Downey, Jeffrey Elkner, Chris Meyers. 1st Edition

**Teaching Plan:**

Week	Content
1-2	Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages. Python Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command. Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non Associative Operators.
3-4	Control Structures: Decision making statements, Python loops, Python control statements. Python Native Data Types: Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations).
5-6	Python Functions: Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.
7-8	Python Modules: Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, Standard Modules, Python Packages.
9-10	Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.
11-12	File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files in Python, directories in Python.
13-14	Classes and Objects: The concept of OOPS in Python, Designing classes, Creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.

**Semester-V**  
**Course Code:BCA-503 DSE2**  
**Course Name:R Programming**

**Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

The students will be able to implement statistical data analysis using R Package

**Course Outcome:**After Completion of the course the students will be able to:

- Identify the key components of R programming Language.
- Define the concept of data Science.
- Differentiate between vectors and arrays.
- Outline the usage of data frames, lists, factors, tables and R structures.
- Explain the need and utilization of various visualization tools.

**Unit-I**

R Programming Fundamentals: Introduction to R, Installing R, Windows/Linux/Mac Installation, Setting up Path, Using Packages, and Running R: Interactive Mode, Batch Mode, Getting Help, Startup and Shut Down. Vectors: Scalars, Vectors, Arrays and Matrices, Declarations, Recycling, Common Vector Operations, Using all() and any(), Na and Null Values, Filtering, ifelse() Function. Matrices and Arrays: Creating Matrices, General Matrix Operations, Applying Functions to Matrix Rows and Columns, Adding & Deleting Matrix Rows and Columns, Difference Between Matrix and Vector. Lists: Creating Lists, General List Operations, Accessing List Components and Values, Applying Functions to Lists, Recursive Lists. Data Frames: Creating Data Frames, Merging Data Frames, Applying Functions to Data Frames. Factors and Tables: Introduction, Common Functions use with Factors, Working with Tables.R Programming Structures: Control Statements, Arithmetic and Boolean Operators, Default Values for Arguments, Return Values, Recursion.

**Unit-III**

Object Oriented Programming: Concept of Classes, S3 Classes, S4 Classes, S3 Versus S4 Classes, Managing Objects. Input/Output: Accessing Keyboard and Monitor, Reading and Writing Files, Accessing the Internet. String Manipulation: Overview of String Manipulation Functions [grep(), nchar(), paste(), sprintf(), substr(), strsplit(), regexpr(), gregexpr()], Regular expression. Graphics: Creating Graphs, Customizing Graphs, Saving Graphs to Files, Creating 3D Plots. Debugging: Principles of Debugging, Use of Debugging Tool, Using R Programming Debugging Facilities. Simulation: Generating Random Numbers, Setting the Random Number Seed, Simulating a Linear Model, Random Sampling.

**Reference Book:**

1. W. N. Venables, D. M. Smith, An Introduction to R, R-core team,2015
2. William N. Venables and David M. Smith, An Introduction to R. 2nd Edition. Network Theory Limited.2009
3. Norman Matloff, The Art of R Programming - A Tour of Statistical Software Design, No Starch Press.2011

Board of Studies held on 19/04/2022

**Teaching Plan:**

<b>Week</b>	<b>Content</b>
1-2	R Programming Fundamentals: Introduction to R, Installing R, Windows/Linux/Mac Installation, Setting up Path, Using Packages, and Running R: Interactive Mode, Batch Mode, Getting Help, Startup and Shut Down.
3-4	Vectors: Scalars, Vectors, Arrays and Matrices, Declarations, Recycling, Common Vector Operations, Using all() and any(), Na and Null Values, Filtering, ifelse()
5-6	Function. Matrices and Arrays: Creating Matrices, General Matrix Operations, Applying Functions to Matrix Rows and Columns, Adding & Deleting Matrix Rows and Columns, Difference Between Matrix and Vector.
7-8	Lists: Creating Lists, General List Operations, Accessing List Components and Values, Applying Functions to Lists, Recursive Lists.
9-10	Data Frames: Creating Data Frames, Merging Data Frames, Applying Functions to Data Frames. Factors and Tables: Introduction, Common Functions use with Factors, Working with Tables.R Programming Structures: Control Statements, Arithmetic and Boolean Operators, Default Values for Arguments, Return Values, Recursion.
11-12	Object Oriented Programming: Concept of Classes, S3 Classes, S4 Classes, S3 Versus S4 Classes, Managing Objects. Input/Output: Accessing Keyboard and Monitor, Reading and Writing Files, Accessing the Internet..
13-14	String Manipulation: Overview of String Manipulation Functions [grep(), nchar(), paste(), sprintf(), substr(), strsplit(), regexpr(), gregexpr()], Regular expression. Graphics: Creating Graphs, Customizing Graphs, Saving Graphs to Files, Creating 3D Plots. Debugging: Principles of Debugging, Use of Debugging Tool, Using R Programming Debugging Facilities. Simulation: Generating Random Numbers, Setting the Random Number Seed, Simulating a Linear Model, Random Sampling

**Semester-V**  
**Course Code:BCA-503 DSE3**  
**Course Name: Workshop on Internet of Things**

**Max Marks: 100**

**External Examination: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 25**

**Lectures to be delivered: 45-55 Hrs.**

**Objectives of the Subject:**

Students will understand the concepts of Internet of Things and can able to build IoT applications.

**Course Outcome:** After Completion of the course the students will be able to:

- Define the concept of IoT
- Outline various domains of IOT
- Explain M2M (machine to machine) applications with necessary protocols
- Express the need of IOT system management.
- Implement the basic Raspberry PI platform for creating IOT applications

**Unit-I**

Definition and Need of IoT, Characteristics of IoT, Physical Design of IoT – IoT Protocols, Logical Design of IoT, IoT Enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IoT Levels and Templates. Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.M2M Applications, Software Defined Networks, Network Function Virtualization.

**Unit-II**

Need for IoT System Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF, YANG, IoT System Management with NETCOZF-YANG, IoT Design Methodology. Introduction to Raspberry PI-Interfaces , Introduction to Cloud Storage Models and Communication APIs Webserver – Web Server for IoT, Cloud for IoT, Security Management in an IoT System.

**Reference Books:**

1. The Internet of Things-Enabling Technologies, Platforms, and Use Cases, Pethuru Raj & Anupama C. Raman, CRC Press, 2017.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014
3. The Definitive Guide to the Internet of Things for Business, Syed Zaeem Hosain, Aeris Communications, 2016, 2nd edition.
4. Internet of Things: Architecture and Design Principals, Raj Kamal, McGrawHill, 2017.

**Text Books:** 1. Internet of Things – A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti, First Edition, 2015, University Press.

**Teaching Plan:**

<b>Week</b>	<b>Content</b>
1-2	Definition and Need of IoT, Characteristics of IoT, Physical Design of IoT – IoT Protocols, Logical Design of IoT, IoT Enabled Technologies – Wireless Sensor
3-4	Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IoT Levels and Templates. Unit-II
5-6	Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.M2M Applications, Software Defined Networks, Network Function Virtualization.
7-8	Need for IoT System Management, Simple Network Management Protocol, Network Operator Requirements,
9-10	NETCONF, YANG, IoT System Management with NETCOZF-YANG, IoT Design Methodology.
11-12	Introduction to Raspberry PI-Interfaces , Introduction to Cloud Storage Models and Communication APIs
13-14	Webserver – Web Server for IoT, Cloud for IoT, Security Management in an IoT System.

**Semester V**  
**Course Code:BCA 504**  
**COURSE NAME:Information Security**

**Max Marks: 100**

**External Examination: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 25**

**Lectures to be delivered: 45-55 Hrs.**

**Objectives of the Subject:**

This programme aims to provide a foundational platform for Cyber Security Aspirants by providing Cyber Security Awareness and Training that heighten the chances of catching a scam or attack before it is fully enacted, minimizing damage to the resources and ensuring the protection of information technology assets.

**Course Outcome:** After Completion of the course the students will be able to:

- Identify issues involved in the field of information security.
- Categorize various types of viruses.
- Outline the information security risks across the Internet and WWW.
- Explain different encryption techniques
- Define cryptography

UNIT-I

Introduction to Information Security , Security Threats – Intruders, Viruses, Worms, Botnet other Threats, Vulnerabilities, Security Goals, Security Services and mechanisms, Types of Attacks, Computer Criminals, Conventional Cryptographic Techniques : Conventional substitution and transposition ciphers, Symmetric and Asymmetric Cryptographic, Authentication and Digital Signatures : Use of Cryptography for authentication, Secure Hash function

UNIT-II

Program Security : Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Malware, Salami attack, Man-in-the- middle attacks, Covert channels

Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honey pots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGPS/MIME

**Text Books**

1. Charles P.Pfleeger, Shari Lawrence. Security in Computing, Pfleeger. PHI.
2. Jason Andress. The Basics of Information Security, Syngress
3. Mark Stamp. Information Security: Principles and Practice, Wiley.
4. A. Kahate, Cryptography and Network Security, TMH.

**Teaching Plan:**

Board of Studies held on 19/04/2022

Week	Content
1-2	Introduction to Information Security , Security Threats
3-4	Intruders, Viruses, Worms, Botnet other Threats, Vulnerabilities, Security Goal
5-6	Security Services and mechanisms, Types of Attacks, Computer Criminals, Conventional Cryptographic Techniques : Conventional substitution and transposition ciphers
7-8	Symmetric and Asymmetric Cryptographic, Authentication and Digital Signatures : Use of Cryptography for authentication, Secure Hash function
9-10	Program Security : Nonmalicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Malware, Salami attack, Man-in-the- middle attacks, Covert channels
11-12	Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security
13-14	Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP,S/MIME



**Semester V**  
**Course Code:BCA-505 GE1**  
**COURSE NAME:Linux Operating System**

**Maximum Marks: 50**  
**Internal Examination: 50**

**Maximum Time: 3 Hrs.**  
**Minimum Pass Marks: 35%**  
**Lectures to be delivered: 45-55 hrs**

**Objectives of the Subject:**

The objective of this course is familiarize the students with basic Linux commands, setting file permissions, managing user accounts and shell programming.

**Course Outcome:** After Completion of the course the students will be able to:

1. Discuss the evolution of Open Source operating systems.
2. Prepare environment for working on open source operating system like Linux.
3. Perform resource management in Linux
4. Write scripts in Linux.
5. Execute user level privileges

Unit-I

Introduction to Linux: History of Linux & Unix, Overview of Linux Operating System, structure of Linux Operating system, Installation. Desktops (The X window System, GNOME, KDE), desktop operations. Different types of editors, vi editor and its command.

Files Systems & Linux Software Linux Files, File structure, commands for managing files & directories with other commonly used commands, Software Management.

Linux Administration: Managing users, Superuser Control, Managing File Systems.

Unit-II

Shells and Utilities: Role of shells in the Linux environment, Different types of shells in Linux Operating system. Shell Scripting: Different types of statements in shell script, variables in shell, assign values to shell variables, Default shell variables value, Rules for Naming variables, Display the value of shell variables Getting User writing simple shell scripts to accept input from the user and display a message on screen, Shell scripts to implement various control statements.

**Text Books:**

1. Linux: The complete reference by Richard Petersen, Published by Tata McGrawHill Publication.
2. Linux in a Nutshell: A Desktop Quick Reference, 6th Edition by Stephen Figgins, Arnold Robbins, Ellen Siever & Robert Love Published by O'Reilly Media.
3. Linux Administration: A Beginner's Guide by Steve Shah & Wale Soyinka, Published by McGraw-Hill Education
4. Unix Shell Programming by Yashavant P. Kanetkar, Published by BPB Publishers.

**Teaching Plan:**

<b>Week</b>	<b>Content</b>
1-2	Introduction to Linux: History of Linux & Unix, Overview of Linux Operating System, structure of Linux Operating system, Installation. Desktops (The X window System, GNOME, KDE), desktop operations.
3-4	Different types of editors, vi editor and its command.
5-6	Files Systems & Linux Software Linux Files, File structure, commands for managing files & directories with other commonly used commands, Software Management. Linux Administration: Managing users, Superuser Control, Managing File Systems.
7-8	Shells and Utilities: Role of shells in the Linux environment, Different types of shells in Linux Operating system.
9-10	Shell Scripting: Different types of statements in shell script, variables in shell, assign values to shell variables, Default shell variables value, Rules for Naming variables,
11-12	Display the value of shell variables Getting User writing simple shell scripts to accept input from the user and display a message on screen,
13-14	Shell scripts to implement various control statements.

**Semester V**  
**Course Code:BCA-505 GE2**  
**COURSE NAME:PC Assembly & Troubleshooting**

**Maximum Marks: 50**  
**Internal Assessment: 50**

**Maximum Time: 3 Hrs.**  
**Minimum Pass Marks: 35%**  
**Lectures to be delivered: 45-55 hrs**

**Course Objectives:**

This course helps student step by step through the typical hardware and operating system problems encountered by technicians, teaching troubleshooting techniques to decipher any problem, and giving you the skills you need to solve them. Students will understand basic concept & structure of computer hardware and apply their knowledge about computer peripherals to identify / rectify problems onboard.

**Course Learning Outcomes**

1. Identify various components of computer systems.
2. Differentiate between types of processors required for different computer systems.
3. Explain the steps to install, connect and configure various peripheral devices
4. Execute the troubleshooting issues in Computer Systems
5. Explain how resources can be shared over network

**Unit I**

Brief history of computer on the basis Hardware. Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices, different processors used for personal computers and notebook computers.

Perform installation, configuration, and upgrading of microcomputer/ computer: Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation replacement of motherboard, troubleshooting problems with memory

**Unit II**

Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems. Drivers: Meaning, role and types

Diagnose and troubleshooting of microcomputer/ computer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components. Booting and its types

**Text Books:** 1. PC Hardware: The Complete Reference, McGraw-Hills

**Reference Books:** 1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer  
2. PC Hardware: A Beginner's Guide by Ron Gilster.

**Teaching Plan:**

Week	Content
1-2	Brief history of computer on the basis Hardware. Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices,
3-4	different processors used for personal computers and notebook computers. Perform installation, configuration, and upgrading of microcomputer/ computer:
5-6	Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation replacement of motherboard, troubleshooting problems with memory <b>Unit II</b>
7-8	Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems.
9-10	Drivers: Meaning, role and types
11-12	Diagnose and troubleshooting of microcomputer/ computer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded,
13-14	different approaches to installing and supporting I/O device, managing faulty components. Booting and its types

**Semester VI**  
**Course Code:BCA-601 E1**  
**COURSE NAME:Computer Graphics**

**Max Marks: 100**  
**External Examination: 75**  
**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**  
**Internal Assessment: 25**  
**Lectures to be delivered: 45-55 Hrs.**

**Course Objectives:**

- This course will introduce students to all aspects of computer graphics including hardware, software and applications.
- It will help students to apply graphics programming techniques to design, and create computer graphics.

**Course Learning Outcomes**

- Introducing the basic concepts used in computer graphics.
- Enables to implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- Familiarize the importance of viewing and projections.
- Will make us understand a typical graphics pipeline .

**(A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

**(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**UNIT-I**

**Functioning of Input devices:** Keyboard, Touch panel, Light pens, Graphic tablets, Joysticks, Data glove, Image scanner, Mouse.

**Functioning of Output devices:** Impact and non impact printers, such as line printer, dot matrix, laser, ink-jet, electrostatic, flatbed and drum plotters.

**Functioning of Video Display Devices:** Refresh cathode ray tube, raster scan displays, random scan displays, color CRT monitors, DVST, flat-panel displays, virtual reality, raster scan systems, Frame buffer and video controller.

**Scan conversion algorithms** for line, circle and ellipse, Bresenham's algorithms, area filling techniques.

**UNIT-II**

**2-d Graphics:** 2-dimensional Geometric transformations(translation, Scaling, Rotation, Reflection, Shearing), Viewing transformation.

**2D clipping algorithms** (Cohen Sutherland and Liang Barsky's line clipping algorithms), polygon and text clipping.

**3-dimensional Graphics:** Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing),Composite transformations

**Mathematics of Projections** (parallel & perspective),3-D viewing transformations and clipping.

**Text Books:**

Board of Studies held on 19/04/2022

1. D. Hearn and M.P. Baker, "Computer Graphics", PHI New Delhi; Second Edition.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes, R.L Phillips, "Introduction to Computer Graphics", Addison-Wesley Publishing company, N.Y.; Second Edition.

**Reference Book:**

1. R.A. Plastock and G. Kalley, "Computer Graphics", McGraw Hill.

**Teaching Plan:**

Week	Content
1-2	<b>Functioning of Input devices:</b> Keyboard, Touch panel, Light pens, Graphic tablets, Joysticks, Data glove, Image scanner, Mouse.
3-4	<b>Functioning of Output devices:</b> Impact and non impact printers, such as line printer, dot matrix, laser, ink-jet, electrostatic, flatbed and drum plotters.
5-6	<b>Functioning of Video Display Devices:</b> Refresh cathode ray tube, raster scan displays, random scan displays, color CRT monitors, DVST, flat-panel displays, virtual reality, raster scan systems, Frame buffer and video controller.
7-8	<b>Scan conversion algorithms</b> for line, circle and ellipse, Bresenham's algorithms, area filling techniques.
9-10	<b>2-d Graphics:</b> 2-dimensional Geometric transformations(translation, Scaling, Rotation, Reflection, Shearing), Viewing transformation,
11-12	<b>2D clipping algorithms</b> (Cohen Sutherland and Liang Barsky's line clipping algorithms), polygon and text clipping.
13-14	<b>3-dimensional Graphics:</b> Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Composite transformations, Mathematics of Projections (parallel & perspective), 3-D viewing transformations and clipping.

**Semester VI****Course Code:BCA-601 E1(P)****COURSE NAME:Software Lab – VIII (Based on BCA-601 Computer Graphics)****Maximum Marks: 50****External Examination: 50****Maximum Time: 3 Hrs.****Minimum Pass Marks: 35%****Lectures to be delivered: 45-55 hrs****Course Objectives:****Course Outcomes:** On completion of this course, the student will be able to:

- i. To introduce the students with of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
- ii. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- iii. Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
- iv. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- v. To describe the importance of viewing and projections.

This laboratory course will comprise as exercises to supplement what is learnt under paper based on paper BCA-601 Computer Graphics

**The breakup of marks for the practical will be as under:**

<b>i.</b>	<b>Lab Record (Internal Assessment)</b>	<b>10 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Program Development and Execution(External Evaluation)</b>	<b>20 Marks</b>

**Semester VI**  
**Course Code:BCA-601 E2**  
**COURSE NAME:Machine Learning**

**Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Objectives of the Subject:**

- To introduce students to the basic concepts and techniques of Machine Learning.
- To develop skills of using recent machine learning software for solving practical problems.
- To gain experience of doing independent study and research.

**Course Outcome:** After Completion of the course the students will be able to:

- Define the concept of machine learning
- Outline the key characteristics of machine learning algorithms
- Compare the performance of different machine learning algorithms
- Design solution for basic problems using machine learning algorithms
- Explain the concept of reinforcement learning

**Unit-I**

Introduction :What is Machine Learning, Unsupervised Learning, Reinforcement Learning Machine Learning Use-Cases, Machine Learning Process Flow, Machine Learning Categories, Linear regression and Gradient descent

Supervised Learning Classification and its use cases, Decision Tree, Algorithm for Decision Tree Induction Creating a Perfect Decision Tree, Confusion Matrix, Random Forest. What is Naïve Bayes, How Naïve Bayes works, Implementing Naïve Bayes Classifier, Support Vector Machine, Illustration how Support Vector Machine works, Hyper parameter Optimization, Grid Search Vs Random Search, Implementation of Support Vector Machine for Classification.

**Unit-II**

Clustering What is Clustering & its Use Cases, K-means Clustering, How does K-means algorithm work, C-means Clustering, Hierarchical Clustering, How Hierarchical Clustering works. Why Reinforcement Learning, Elements of Reinforcement Learning, Exploration vs Exploitation dilemma, Epsilon Greedy Algorithm, Markov Decision Process (MDP) Q values and V values, Q – Learning,  $\alpha$  values

**Text Books:**

1. Pattern Reorganization and Machine learning by Christopher M. Bishop.
2. The elements of Statistical learning by Jeromeh. Friedman, Robert Tivshirani and Trevorhaspie.
3. Introduction to Machine Learning by Ethem Alpaydin. PHI Publisher.
4. Machine Learning, A practical approach on the statistical learinging theory by Rodrigo fernandes de Mello and Moacir Antonelli Ponti.
5. Machine Learning A probabilistic prospective by Kevin P. Murphy



**Teaching Plan:**

<b>Week</b>	<b>Content</b>
1-2	Introduction :What is Machine Learning, Unsupervised Learning, Reinforcement Learning Machine Learning Use-Cases, Machine Learning Process Flow, Machine Learning Categories, Linear regression and Gradient descent
3-4	Supervised Learning Classification and its use cases, Decision Tree, Algorithm for Decision Tree Induction Creating a Perfect Decision Tree,
5-6	Confusion Matrix, Random Forest. What is Naïve Bayes, How Naïve Bayes works, Implementing Naïve Bayes Classifier, Support Vector Machine,
7-8	Illustration how Support Vector Machine works, Hyper parameter Optimization, Grid Search Vs Random Search, Implementation of Support Vector Machine for Classification.
9-10	Clustering What is Clustering & its Use Cases, K-means Clustering, How does K-means algorithm work, C-means Clustering, Hierarchical Clustering,
11-12	How Hierarchical Clustering works.Why Reinforcement Learning, Elements of Reinforcement Learning,
13-14	Exploration vs Exploitation dilemma, Epsilon Greedy Algorithm, Markov Decision Process (MDP) Q values and V values, Q – Learning, $\alpha$ values

**Semester VI**  
**Course Code:BCA-601 E2(P)**  
**COURSE NAME:Software Lab – VIII (Based on BCA-601 E2 Machine Learning)**

**Maximum Marks: 50**

**External Examination: 50**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35%**

**Lectures to be delivered: 45-55 hrs**

**Objective of the course:**

- To introduce the students with the components of a graphics system and become familiar with the building approach of graphics system components and algorithms related to them.
- Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- . To describe the importance of viewing and projections.

**Course Outcome:** After Completion of the course the students will be able to:

- Differentiate between various data types.
- Implement programs for various Learning algorithms.
- Compare different machine learning algorithms.
- Choose the right algorithm for different problems.
- Apply Machine Learning algorithms to solve real world problems.

This laboratory course will comprise as exercises to supplement what is learnt under paper based on paper BCA-601 MACHINE LEARNING

**The breakup of marks for the practical will be as under:**

<b>i.</b>	<b>Lab Record (Internal Assessment)</b>	<b>10 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Program Development and Execution(External Evaluation)</b>	<b>20 Marks</b>

**Semester VI**  
**Course Code:BCA-602 E1**  
**Course Name:Web Development Using ASP .Net**

**Max Marks: 100**

**External Examination: 75**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 25**

**Lectures to be delivered: 45-55 Hrs.**

**Course Objectives :**

- 1..This course will provide students with the tools and techniques to build dynamic Web sites using the ASP.Net programming environment.
2. Develop a data driven web application.
- 3.Understand the fundamentals of developing modular application by using object oriented methodologies.

**Course Learning Outcomes**

- 1..Understand the Microsoft .NET Framework and ASP.NET page structure
2. Design web application with variety of controls
3. Access the data using inbuilt data access tools
4. Use Microsoft ADO.NET to access data in web Application
5. Configure and deploy Web Application
6. Develop secured web application

**(A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

**(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**Unit I**

**Introduction:** Introduction to Microsoft ASP.NET, .Net Framework, An overview of .NET including the Common Language Interface, Common Type System, Common Language Runtime, and .NET class libraries. Language and platform neutrality. An introduction to Web Forms, The ASP.NET execution model.

**ASP.NET Web Application User Interface:** Creating an ASP.NET Web application user interface with various controls, creating and using Master page, Implementing event handlers by using code-behind files, Explain user input by using validation controls.

**Unit II**

**Managing State:** The Various Means to Manage State, Request object, Application object, Cache object, Session object, Server-side state management, Using session for server-side and client-side state management.

**XML Web Services:** Need of XML Web services, Understanding the Web Service Model, Creating an ASP.NET Web Service. Implementing Navigation for the User Interface: Round Trip and Post back, State Management for user navigation, Navigation between Pages.

**Storing and Retrieving Data with ADO.NET:** ADO.NET Overview, Connecting to Data, Executing SQL with Commands, Accessing Data with ADO.NET, Fast Data Access with Data Readers, DataSet Basics, Filling DataSets with Data Adapters.

**Data Binding:** Bind Data to the UI, Transform and Filter Data.

**Security:** Authenticating and Authorizing Users, Using Windows Authentication, Using Forms Authentication. Using Caching Page: Output Caching, User Control Caching, Data Caching

**Text Books:**

1. Matthew MacDonald: ASP.NET: The Complete Reference, Osborne.

2. Jesse Liberty, Dan Hurwitz: Programming ASP.NET, O'Reilly.

**Reference Books:**

1. Stephen Walther: ASP.NET 3.5 Unleashed, SAMS.
2. Infosys Campus Connect Foundation Program Volume:1 – 3, Education & Research Department, Infosys Technologies Ltd , Bangalore.

**Teaching Plan:**

Week	Content
1-2	<b>Introduction:</b> Introduction to Microsoft ASP.NET, .Net Framework, An overview of .NET including the Common Language Interface, Common Type System, Common Language Runtime, and .NET class libraries. Language and platform neutrality. An introduction to Web Forms, The ASP.NET execution model.
3-4	<b>ASP.NET Web Application User Interface:</b> Creating an ASP.NET Web application user interface with various controls, creating and using Master page, Implementing event handlers by using code-behind files, Explain user input by using validation controls.
5-6	<b>Managing State:</b> The Various Means to Manage State, Request object, Application object, Cache object, Session object, Server-side state management, Using session for server-side and client-side state management.
7-8	<b>XML Web Services:</b> Need of XML Web services, Understanding the Web Service Model, Creating an ASP.NET Web Service. Implementing Navigation for the User Interface: Round Trip and Post back, State Management for user navigation, Navigation between Pages.
9-10	<b>Storing and Retrieving Data with ADO.NET:</b> ADO.NET Overview, Connecting to Data, Executing SQL with Commands, Accessing Data with ADO.NET, Fast Data Access with Data Readers, DataSet Basics, Filling DataSets with Data Adapters.
11-12	<b>Data Binding:</b> Bind Data to the UI, Transform and Filter Data.
13-14	<b>Security:</b> Authenticating and Authorizing Users, Using Windows Authentication, Using Forms Authentication. Using Caching Page: Output Caching, User Control Caching, Data Caching

**Semester VI**  
**Course Code:BCA-602 E1(P)**  
**Course Name:Software Lab – IX (Based on paper BCA-602 E1)**

**Maximum Marks: 50**

**External Examination: 50**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35%**

**Lectures to be delivered: 45-55 hrs**

**Objectives of the Lab:**

- To develop web pages using ASP.NET
- To use ASP.NET controls in web applications.
- To debug and deploy ASP.NET web applications

**Syllabus Contents:**

This laboratory course will comprise as exercises to implement what is learnt under paper BCA-602 E1 The students will create the web pages using:

1. Standard controls in a web form.
2. List controls and its functions.
3. File upload and calendar control.
4. Create an admission form for a college.
5. Demonstrate the master page.
6. Create a login page which accepts user name and password, then check for authentication of the user.
7. Validation Controls
8. User control that displays the current date and time. Include it in a Web Form and refresh it each time a button is clicked.
9. ADO.NET controls
10. Submits data in the database by using the ado.net controls.

**The breakup of marks for the practical will be as under**

<b>i.</b>	<b>Lab File Record (External Assessment)</b>	<b>10 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Program Development and Execution(External Evaluation)</b>	<b>20 Marks</b>

**Semester VI**  
**Course Code:BCA-602 E2**  
**Course Name:Web Development Using PHP**

**Max Marks: 100****External Examination: 75****Min Pass Marks: 35%****Maximum Time: 3 Hrs.****Internal Assessment: 25****Lectures to be delivered: 45-55 Hrs.****Course Objectives:**

After the completion of the course, students will get hands-on experience on various techniques of web development and will be able to design and develop a complete website.

**Course Learning Outcomes**

- Gain the PHP Programming skills needed to successfully build interactive, data driven sites.
- Use THE MVC Pattern to organize code
- Test and debug a PHP application

**(A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks in all.

**(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**UNIT-I**

Introduction to PHP for Web Development & Web Applications, History& Future Scope of PHP. Installation of tools for working in PHP like XAMPP, LAMP, WAMP for PHP Apache & MySQL.

**Introduction to Language constructs :**Variables, constants, Data types, Comments

**Outputting Data to the Browser:** print(), echo(), printf(), print\_r()

**Programming basic constructs:** operators, decision taking statements: if, if .. else, elseif, switch. iterative statements: while, do .. while, for, foreach. Break and Continue statements.

**Arrays:** Introduction to Array, use of array, indexed Array, Associative Array, Multi-Dimensional Array

**PHP Functions:** User Defining functions, Passing parameter & return value.

**Built-in Functions:** Math functions, String functions, Array Functions. Date & time functions, Date formats, Include, Require.

**Object-Oriented PHP:** Classes, Objects, Constructor & Destructor, Access Specifier, Inheritance, Overloading.

**UNIT-II**

**PHP super-global variables:** Interactive with client using \$\_SERVER, \$\_GET, \$\_POST, \$\_REQUEST, \$\_COOKIE, \$\_SESSION, \$\_FILES

**Form Handling:** Creating Forms using HTML, GET/POST/REQUEST.

**Connecting with database:** SQL queries: insert, select, update, delete, alter table, Primary Key, Foreign Key. Select query with where, Having, Group by, Order by, like, in, not in, between, joins. Database Connectivity: mysqli\_connect, mysqli\_select\_db. Queries: mysqli\_query, mysqli\_fetch\_array, mysqli\_fetch\_assoc, mysqli\_fetch\_row, mysqli\_fetch\_object, mysqli\_insert\_id()

**AJAX:** Introduction to AJAX, AJAX Model, Implementation of Ajax.

**PHP Framework:** Introduction to PHP Framework, Types of Frameworks, Difference Between CMS and MVC.

**Textbooks:**

1. PHP and MYSQL web development (5<sup>th</sup> Edition) by Luke Welling & Laura Thomson.
2. PHP for Beginners by Ivan Bross.

**Reference Books:**

- 1.PHP: The Complete Reference by Steven Holzner
2. PHP Pocket Reference by PHP Pocket Reference.
3. PHP- MySQL Development by Laura Thomson and Luke Welling
4. Head First PHP and MySQL by Beighley

**Teaching Plan**

Week	Content
1-2	Introduction to PHP for Web Development & Web Applications, History& Future Scope of PHP Installation of tools for working in PHP like XAMPP, LAMP, WAMP for PHP Apache & MySQL. Introduction to Language constructs :Variables, constants, Data types, Comments
3-4	Outputting Data to the Browser: print(), echo(), printf(), sprintf() Arrays: Introduction to Array, use of array, Numeric Array, Associative Array, Multi-Dimensional Array
5-6	PHP Functions: User Defining functions, Passing parameter & return value. Built-in Functions: Math functions, String functions, Array Functions. Date & time functions, Date formats, Include, Require.
7-8	Strings and Regular Expressions: Regular Expression Syntax (POSIX), Brackets, Quantifiers, Predefined Character Ranges Form Handling: Creating Forms using HTML, GET/POST/REQUEST.
9-10	State Management: Using Session and Cookies. Object-Oriented PHP: Classes, Objects, Constructor & Destructor, Access Specifier, Inheritance, Overloading.
11-12	<b>PHP super-global variables:</b> Interactive with client using \$_SERVER, \$_GET, \$_POST, \$_REQUEST, \$_COOKIE, \$_SESSION, \$_FILES <b>Form Handling:</b> Creating Forms using HTML, GET/POST/REQUEST.
13-14	<b>Connecting with database:</b> SQL queries: insert, select, update, delete, alter table, Primary Key, Foreign Key. Select query with where, Having, Group by, Order by, like, in, not in, between, joins. Database Connectivity: mysqli_connect, mysqli_select_db. Queries: mysqli_query, mysqli_fetch_array, mysqli_fetch_assoc, mysqli_fetch_row, mysqli_fetch_object, mysql_insert_id() <b>AJAX:</b> Introduction to AJAX, AJAX Model, Implementation of Ajax. <b>PHP Framework:</b> Introduction to PHP Framework, Types of Frameworks, Difference Between CMS and MVC.

**Semester VI**  
**Course Code:BCA-602 E2(P)**  
**COURSE NAME:Software Lab – IX (Based on BCA-602 E2 PHP)**

**Maximum Marks: 50**

**External Examination: 50**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35%**

**Lectures to be delivered: 45-55 hrs**

**Objectives of the Lab:**

After the completion of the course, students will get hands-on experience on various techniques of web development and will be able to design and develop a complete website

**Course Outcomes:** On completion of this course, the student will be able to:

- Test and debug a PHP application
- Use cookies and sessions
- Work with regular expressions, handle exceptions and validate data.

This laboratory course will comprise as exercises to supplement what is learnt under paper based on paper BCA-602 PHP

**The breakup of marks for the practical will be as under:**

<b>i.</b>	<b>Lab Record (Internal Assessment)</b>	<b>10 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Program Development and Execution(External Evaluation)</b>	<b>20 Marks</b>



**Semester VI**  
**Course Code:BCA-602 E3**  
**Course Name: Web Development using NODE.JS**

**Max Marks: 100**  
**External Examination: 60**  
**Internal Assessment: 40**

**Maximum Time: 3 Hrs.**  
**Min Pass Marks: 35%**  
**Lectures to be delivered: 45-55 Hrs**

**Course Objectives:**

The objective of the course is to enable the students to understand and build web applications quickly and efficiently with the help of JavaScript.

**Course Outcomes:** On completion of this course, the student will be able to:

- Installation of Node JS.
- Creating a web server.
- Connect Node Js with database

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three units I, II and III. Each of units I and II will have four questions from the respective sections of the syllabus and each question carry 9 marks. unit III will consist of one compulsory question having 12 parts of short-answer type covering the entire syllabus uniformly and each question will carry 2 marks.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**UNIT- I**

**Web Development:** Introduction to client/server architecture, servers, browsers, WWW, HTTP, FTP, client side and server side programming languages, web development using PHP and its frameworks, introduction to Node.js, benefits of using Node.js, traditional web server model, Node.js process model.

**Node.js:** Installing and setting up a Node.js environment, Installing packages globally using npm, exporting and importing modules, creating HTTP web server, handling http requests using GET and POST method. File system module: reading directories, files and streams. Debugging Node.js application using nodemon. Creating and handling JSON file formats in Node.js.

**UNIT- II**

**Express framework:** Introduction to Express framework to set up a web server, Using template engines:twig, pug, ejs, jade; developing applications using ejs, implementing API routing, middleware, and URL parameters, static files, error handling, debugging.

**Working with MongoDB:** Setting up a MongoDB database and connecting it to a Node.js server. Using Mongoose to model database schema and interact with MongoDB databases, creating database and collection, inserting documents into a collection, finding documents, sorting results, updating documents, deleting and dropping documents/collection.

**Textbooks:**

1. Node .Js, Shah Dhruvi, Publisher: BPB Publications.
2. Beginning Node.js by Basarat Ali Syed.

**References:**1. Web Development with Node and Express by Ethan Brown

### Teaching Plan

1-2	Web Development: Introduction to client/server architecture, servers, browsers, WWW, HTTP, FTP, client side and server side programming languages
3-4	Web development using PHP and its frameworks
5-6	Installing and setting up a Node.js environment, Installing packages globally using npm, exporting and importing modules
7-8	Creating HTTP web server, handling http requests using GET and POST method, File system module: reading directories, files and streams Debugging Node.js application using nodemon. Creating and handling JSON file formats in Node.js.
9-10	Express framework: Introduction to Express framework to set up a web server, Using template engines:twig, pug, ejs, jade Developing applications using ejs, implementing API routing, middleware, and URL parameters, static files, error handling, debugging.
11-12	<b>Working with MongoDB:</b> Setting up a MongoDB database and connecting it to a Node.js server. Using Mongoose to model database schema and interact with MongoDB databases,
13-14	Creating database and collection, inserting documents into a collection, finding documents.Sorting results, updating documents, deleting and dropping documents/collection

**Semester VI**  
**Course Code:BCA-602 E3(P)**  
**COURSE NAME:Software Lab – IX (Based on BCA-602 E3 Node JS)**

**Maximum Marks: 50**

**External Examination: 50**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 35%**

**Lectures to be delivered: 45-55 hrs**

**Course Objectives:**

The objective of the course is to enable the students to understand and build web applications quickly and efficiently with the help of JavaScript.

**Course Outcomes:** On completion of this course, the student will be able to:

- Installation of Node JS.
- Creating a web server.
- Connect Node Js with database

This laboratory course will comprise as exercises to supplement what is learnt under paper based on paper BCA-602 E3 Node Js

**The breakup of marks for the practical will be as under:**

<b>i.</b>	<b>Lab Record (Internal Assessment)</b>	<b>10 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Program Development and Execution(External Evaluation)</b>	<b>20 Marks</b>

**Semester VI**  
**Course Code: BCA-603 E1**  
**COURSE NAME: Quantitative and Logical Aptitude**

**Max Marks: 100****Maximum Time: 3 Hrs.****Min Pass Marks: 35%****Internal Assessment: 100**  
**Lectures to be delivered: 45-55 Hrs.****Course Objectives:**

Student use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests.

**Course Outcomes:** On completion of this course, the student will be able to:

- This course provide the students with an understanding of deductive and inductive reasoning
- To make students understand both Verbal and Non Verbal Reasoning.
- To practise various quantitative aptitude question.

**INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of two units with multiple choice questions. Unit I and unit II will have 25 multiple choice questions from each respective unit.

**INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt all the questions.

**Unit-I**

Verbal Reasoning: Number series, Letter & symbol series, Logical Reasoning problems, Alphabet test, Blood relations, Direction sense test, Input output, Coding-decoding, Number Ranking  
 Non-verbal Reasoning: Making series/analogy, Classification, Series test, Odd figures, Venn diagrams, Mirror Images

**Unit-II**

Quantitative aptitude: whole numbers problems, Problems on Trains, Numbers and Ages, Percentage Problems, Boats and Streams, Ratio & Proportion, Square roots, Averages, Interest, Heights and Distances, Time and distance, Series, Time & Work.

**Text Books:**

1. R.S Aggarwal, "Quantitative aptitude".
2. R. S Aggarwal , "Verbal and non-verbal Reasoning

**Teaching Plan**

1-2	Verbal Reasoning: Number series, Letter & symbol series,
3-4	Logical Reasoning problems, Alphabet test, Blood relations, Direction sense test,

5-6	Input output, Coding-decoding, Number Ranking Non-verbal Reasoning: Making series/analogy, Classification, Series test, Odd figures,
7-8	Venn diagrams, Mirror Images
9-10	Quantitative aptitude: whole numbers problems, Problems on Trains, Numbers and Ages, Percentage
11-12	Problems, Boats and Streams, Ratio & Proportion, Square roots, Averages, Interest,
13-14	Heights and Distances, Time and distance, Series, Time & Work.

**Semester VI**  
**Course Code:BCA-603 E2**  
**Course Name:Personality Development with Presentation & Communication Skills**

**Max Marks: 100****Maximum Time: 3 Hrs.****Internal Assessment: 100****Min Pass Marks: 35%****Lectures to be delivered: 45-55 Hrs.**

**Objective:** The course is aimed at developing Leadership styles and communication skills that are necessary for successful business decisions.

**Course Outcomes:**On completion of this course, the student will be able to:

- Acquaint with different aspects of personality and role of soft skills in personality development.
- Understand psychology and success, self-awareness, goals and obstacles, positive thinking, and self-motivation
- Boost the confidence and present their thoughts eloquently.
- Communicate effectively as a individual and team
- Face interviews with confidence.

**(A) INSTRUCTION FOR THE PAPER SETTER**

The question paper will consist of three Units. Unit I and II will have four questions from the respective sections of the syllabus and each question carry 12 marks. Unit-III will have 9 short answer type questions which will cover the entire syllabus uniformly and will carry 3 marks each.

**(B) INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from unit I and II and the entire unit III.

**UNIT-I**

Introduction to Personality, Personality Development, Types of personality, Dynamics of Personality, Personality Traits, Influences on Personality, Personality Analysis through body language and Individual habits, Physical Aspects of personality, Emotional Stability, Self- awareness, Mind and mental development, Mental Blocks. Communication–Meaning, Definition, Nature and Scope of Communication, Importance of Communication. Communication Process; Principles of Communication; Types of Communication – Interpersonal Communication - Gateway to effective interpersonal Communication.

**UNIT – II**

Barriers to Communication- Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers. Soft Skills: Listening, Speaking, Reading and Writing Skills. Interview: meaning and types of interview, Tips for facing the interview, Group Discussion. Body Language, Presentation Skills. Personal Skills: Emotional Intelligence, Emotion Management, Tolerance of Change, Taking Criticism, Self-Confidence, Adaptability, Resilience, Assertiveness, Self Assessment.

**Recommended Texts:**

Board of Studies held on 19/04/2022

1. Introduction to Psychology by Atkinson and Hilgard s, Edward E. Smith , Geoffrey Loftus.
2. Personality Development by Rajiv K. Mishra , Rupa & Co.
3. Rajendra Pal Korahill, “*Essentials of Business Communication*”, Sultan Chand & Sons, New Delhi, 2006.
4. Ramesh, MS, & C. C Pattanshetti, “*Business Communication*”, R.Chand & Co, New Delhi, 2003.

**Teaching Plan**

Week	Content
1-2	Introduction to Personality, Personality Development, Types of personality, Dynamics of Personality, Personality Traits, Influences on Personality, Personality Analysis through body language and Individual habits,
3-4	Physical Aspects of personality, Emotional Stability, Self- awareness, Mind and mental development, Mental Blocks. Communication–Meaning, Definition, Nature and Scope of Communication, Importance of Communication. Communication Process;
5-6	Principles of Communication; Types of Communication – Interpersonal Communication - Gateway to effective interpersonal Communication.
7-8	Barriers to Communication- Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers.
9-10	Soft Skills: Listening, Speaking, Reading and Writing Skills. Interview: meaning and types of interview,
11-12	Tips for facing the interview, Group Discussion. Body Language, Presentation Skills.
13-14	Personal Skills: Emotional Intelligence, Emotion Management, Tolerance of Change, Taking Criticism, Self-Confidence, Adaptability, Resilience, Assertiveness, Self Assessment.

**Semester VI**  
**Course Code:BCA-604**  
**COURSE NAME: Project**

**Max Marks: 100**  
**External Examination: 75**  
**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**  
**Internal Assessment:25**  
**Lectures to be delivered: 45-55 Hrs.**

**Course Objectives:**

The objective of the course is to enable the students to understand team work.

**Course Outcomes:** On completion of this course, the student will be able to:

- Learn critical thinking skills and inquiring skills through application-oriented project development in team-work environment.
- Learn problem solving skills.

**Project Marks Distribution**

CODE	TITLE OF PAPER	MAXIMUM MARKS
B.C.A-604	Project	100
	<b>Total</b>	<b>100</b>

1. The evaluation committee will distribute these marks for seminar/viva/project report, presentation and for any other activity, which the committee thinks to be proper.

2. Joint projects will be allowed (not more than two students) and individual project reports will be accepted. Individual project reports will be recognized and the students should highlight their contributions in a joint project report.

**Committee for Evaluation of project report/work:**

- i. Head of the Department
- ii. Internal Guide
- iii. External Examiner