

 Estd. 1962 "A++" Accredited by NAAC (2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA PHONE: EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र दूरध्वनी-ईपीएबीएक्स -२६०९०००, अभ्यासमंडळे विभाग दूरध्वनी ०२३१-२६०९०९४ ०२३१-२६०९४८७		
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Ref.No.SU/BOS/Science/150

Date: 26/05/2026.

The Principal,
 All Concerned Affiliated Colleges/Institutions
 Shivaji University, Kolhapur

The Head/Co-ordinator/Director
 All Concerned Department (Science)
 Shivaji University, Kolhapur.

Subject: Regarding revised syllabi of degree programme under the Faculty of Science and Technology as per NEP-2020.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of degree programme under the Faculty of Science and Technology as per NEP-2020.

1.	B.Sc. Part II Medicinal Chemistry (Entire) (2.0)	6.	BCA Part III
2.	B.A./B.A.B.Ed Part III Geography (2.0)	7.	B.Sc. Part II Data Science
3.	B.Sc. Part II Artificial Intelligence	8.	B.Sc.-M.Sc. Part III AI & ML
4.	B.Sc.-M.Sc. Part IV Nano Science and Technology (1.0)	9.	MCA Part II (YCSRD)
5.	B.Sc.-M.Sc. Part III Nano Science and Technology (2.0)	10.	MCA Part II

This syllabus, nature of question and equivalence shall be implemented from the academic year 2026-2027 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in>Syllabus>Syllabus as per NEP2020.

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2026 & March/April 2027. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,



Dy Registrar

Encl: as above

for information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.A.,OE-II & B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section

SHIVAJI UNIVERSITY, KOLHAPUR



NAAC A++ Grade with CGPA 3.52

As per
National Education Policy (NEP-2020)

Syllabus for
Bachelor of Computer Applications (BCA)
(Under Faculty of Science and Technology)

PART-III SEMESTER V & VI

(Syllabus to be implemented from Academic Year 2026-27)

Bachelor of Computer Applications (BCA) Part III

(NEP-2020)

Syllabus to be implemented from Academic year 2026-27

Semester V

BCA Part - III SEMESTER-V (Duration- Six Month)										
Sr. No.	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectur es per week	Practical Per week	Credit	Maxim um Marks	Minim um Marks	Exam minute	Maximum Marks	Minimu m Marks	Exam minute s
1	Major IX: ASP.NET	2	-	2	40	16	90	10	04	20
2	Major X : Basics of Python Programming	2	-	2	40	16	90	10	04	20
3	Major Practical V(a): ASP.NET Lab	-	4	2	40	16	90	10	04	20
4	Major Practical V (b): Basics Python Programming Lab	-	4	2	40	16	90	10	04	20
5	Major Elective I ✓ Front End Development ✓ PHP	2	-	2	40	16	90	10	04	20
6	Major Practical-I ✓ Front End Development Lab ✓ PHP Lab	-	4	2	40	16	90	10	04	20
7	Open Elective V: Cloud Computing	2	-	2	40	16	90	10	04	20
8	VSC-II: Major specific: Basic AI Tools	-	4	2	40	16	90	10	04	20
9	AEC-III: Corporate Culture & Communication	2	-	2	40	16	90	10	04	20
10	OJT : On Job Training	-	-	4	80	32	180	20	08	40
	Total (A)			22	440			110		

BCA Part - III SEMESTER-VI (Duration- Six Month)												
Sr. No.	Course Code	Teaching Scheme			Examination Scheme							
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)				
		Lectures Per week	Practical Per week	Credits	Maximum Marks	Minimum Marks	Exam minute	Maximum Marks	Minimum Marks	Exam minutes		
1	Major XI: Basics of JavaScript	2	-	2	40	16	90	10	04	20		
2	Major XII: Advanced Python Programming	2	-	2	40	16	90	10	04	20		
3	Major Practical VI (a): Basics of JavaScript Lab	-	4	2	40	16	90	10	04	20		
4	Major Practical VI (b): Advanced Python Programming Lab		4	2	40	16	90	10	04	20	04	20
5	Major Elective II: ✓ Back End Development ✓ Advanced PHP	2	-	2	40	16	90	10	04	20		
6	Major Practical II ✓ Back End Development Lab ✓ Advanced PHP Lab	-	4	2	40	16	90	10	04	20		
7	VSC III: Major specific: Advanced AI Tools	-	4	2	40	16	90	10	04	20		
8	SEC III Cyber Security	2	-	2	40	16	90	10	04	20		
9	AEC IV: Professional Ethics & Corporate Skills	2	-	2	40	16	90	10	04	20		
10	IKS: Indian Knowledge Systems for Technology	2	-	2	40	16	90	10	04	20		
11	FP: Field Project	-	-	2	40	16	90	10	04	20		
	Total (B)			22	440			110				

Exit option after Level 6: Students can exit with Bachelor of Computer Applications

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

ASP.NET

Course Outcomes:

After completion of this course students will be able to:

1. Explain the ASP.NET page life cycle and use standard web controls, validation controls
2. Integrate databases in applications using ADO.NET, LINQ, and DataBound controls
3. Design and deploy .NET-based software solutions using Web Forms
4. Explain the concepts of state management and caching in ASP.NET and use AJAX to build dynamic and responsive web applications.
5. Describe the structure and components of web services, including WSDL and namespaces.
6. Apply various types of CSS to design and enhance the layout of web pages and integrate them into master pages in ASP.NET.

UNIT-I

(15 Hours)

ASP.NET: Page Life Cycle, Standard controls, Data Controls, Sample Application Development, Web services, Server side Validation Controls, Working with DataBases: Working with ADO.NET, Data Binding using DataBound Control, connected architecture, disconnected architecture. Microsoft SQL Server: Creation of Table, Views, Stored Procedures

UNIT-II

(15 Hours)

State management, Caching, AJAX, AJAX Extenders, Building and understanding web services, anatomy of a web service, overview of web service namespaces, building a simple web service, Web Service Description Language (WSDL). Introduction to CSS, Types of CSS, Applying CSS to Master pages in ASP.NET

Reference Books:

1. ASP.NET Core Application Development - Building An Application in Four Sprints
by James Chambers , David Paquette, et al. , 2017
2. Beginning ASP.NET for Visual Studio 2015 by William Penberthy

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Basics of Python Programming

Course Outcomes:

After completion of this course students will be able to:

1. Describe the features, principles, and applications of Python.
2. Identify and apply various Python operators, including arithmetic, assignment, comparison.
3. Use input/output functions, comments, and type conversions effectively in Python programming.
4. Apply control flow concepts such as if, if-else, nested if, while, and for loops.
5. Implement exception handling using try and except blocks to manage runtime errors and syntax exceptions.
6. Read from and write to files using Python, and apply techniques for handling different file formats.

UNIT- I:

(15 Hours)

Introduction – Installing Python, Features and principles of Python, applications of Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, Multiple line statements, Identifiers, Keywords, Statements and Expressions – Variables Operators, Arithmetic operators, Assignment operators , Comparison operators – Logical operators ,Bitwise operators - Precedence and Associativity, Data types , Number, Booleans, Strings, Indentation, Comments, Single line comment, Multiline comments - Reading Input, Print output, Type Conversions.

UNIT- II:

(15 Hours)

Control flow statements If statement , If else statement , nested if statement - while loop , for loop, continue and break statements ,catching exceptions using try and except statement ,syntax errors , exceptions, exception handling ,Strings function. Nesting loops in loops, looping until a condition is reached, and repetition based on user input, controlling Loops using Break and Continue. Reading and Writing files: kinds of files, Opening a File, techniques for reading files, files over the internet, Writing files, file reading techniques.

Reference Books:

1. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication.
2. Introduction to Python for Computational Science and Engineering Hans Fangohr.
3. John V Guttag. "Introduction to Computation and Programming Using Python
4. R. Nageswara Rao, "Core Python Programming", Dreamtech

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

ASP.NET Lab

Course Outcomes:

After completion of this course students will be able to:

1. Develop dynamic web applications using ASP.NET framework and implement server-side controls.
2. Design and connect web applications to databases using ASP.NET with proper data handling techniques.
3. Implement form validation, session management, and state management in ASP.NET applications.

There will be minimum 20 practicals based on ASP.NET

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Basics Python Programming Lab

Course Outcomes:

After completion of this course students will be able to:

1. Write Python programs using basic constructs such as variables, data types, operators, control structures, and functions.
2. Develop Python programs using lists, tuples, dictionaries, and file handling concepts.
3. Integrate logical problem-solving skills to build simple applications using ASP.NET and Python programming.

There will be minimum 20 practicals based on Basics Python Programming

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Front End Development

Course Outcomes:

After completion of this course students will be able to:

1. To understand the fundamentals of server-side JavaScript
2. To develop backend programming skills by implementing callback functions
3. To design and integrate databases with Node.js applications by creating schemas and performing CRUD operations using MongoDB.
4. To build RESTful web services by designing and implementing REST APIs using HTTP methods
5. To implement secure authentication mechanisms by applying JSON Web Token
6. To manage Node.js applications and system resources

UNIT- I

(15 Hours)

Introduction to Nodejs, Architecture of Nodejs Application, Advantages of Node JS, Synchronous and Asynchronous Programming, Call back Function in nodejs, Promises in Nodejs, Mongoddb with Nodejs, Design the Schema in Nodejs, Design the Rest API's, GET, POST, PUT, DELETE, JSON web Token Authentication in nodejs, Create the Auth APP in nodejs

UNIT- II

(15 Hours)

NodeJS Modules, Functions, Buffer, Module, Module Types, Core Modules, Local Modules, Module.Exports, NPM, Installing Packages Locally, Adding dependency in package.json, installing packages globally, updating packages, Fs.read File, Writing a File, Writing a file asynchronously, Opening a file, Deleting a file, Other IO Operations, When to use Event Emitters, Binding Functions to Events, Event Requests, Event Listening

Reference Books:

1. Node.js web development by David Herron
2. Beginning Node.js, Express & MongoDB Development by Greg Lim
3. Node.js Design Patterns by Mario Casciaro and Luciano Mammino

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

PHP

Course Outcomes:

After completion of this course students will be able to:

1. Understand fundamentals of web technologies.
2. Explore various PHP features.
3. Introduce students to server-side scripting using PHP.
4. Understand installing and configuring XAMPP/WAMP server
5. Develop dynamic and interactive web applications
6. Develop PHP programs using variables, operators, control structures, and user-defined functions.

UNIT- I

(15 Hours)

Introduction to PHP, Introduction to Web Technologies, Client-side vs Server-side scripting, Introduction to PHP and its features, Installing and configuring XAMPP/WAMP server, PHP syntax and structure, Variables, constants, and data types, Operators in PHP: Arithmetic, Assignment, Comparison, Increment/Decrement, Logical, Conditional (Ternary), Array Operators etc .

UNIT- II

(15 Hours)

Control Structures and Functions: Conditional statements: if, if-else, nested if, switch case, Looping statements: for loop, while loop, do-while loop, foreach loop, Functions in PHP, User-defined functions, Function with parameters and return values, Arrays in PHP, Indexed array, Associative array, Multidimensional array.

Reference Books:

1. Luke Welling and Laura Thomson – PHP and MySQL Web Development, Addison-Wesley Professional.
2. Robin Nixon – Learning PHP, MySQL, JavaScript, CSS & HTML5, O'Reilly Publications.
3. Steven Holzner – PHP: The Complete Reference, Tata McGraw-Hill.
4. Joel Murach and Ray Harris – Murach's PHP and MySQL, Mike Murach & Associates.
5. Larry Ullman – PHP for the Web: Visual QuickStart Guide, Peachpit Press.
6. Ivan Bayross and Sharanam Shah – PHP for Beginners, SPD Publications

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Front End Development Lab

1. Design and develop interactive front-end user interfaces integrated with backend services built using Node.js.
2. Implement asynchronous communication (AJAX/Fetch API) to consume RESTful APIs (GET, POST, PUT, DELETE) in web applications.
3. Develop secure front-end applications by integrating JSON Web Token (JWT)–based authentication mechanisms.
4. Manage application dependencies and modules using NPM and configure front-end project environments effectively.
5. Handle event-driven programming concepts, including event binding and event handling, to create dynamic user experiences.
6. Integrate front-end applications with MongoDB-backed Node.js services to perform CRUD operations and display real-time data.

There will be minimum 20 practicals based on Front End Development

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

PHP Lab

1. Understand and configure PHP development environments using XAMPP/WAMP server and demonstrate basic PHP syntax and structure.
2. Differentiate between client-side and server-side scripting and implement dynamic web pages using PHP.
3. Apply PHP variables, constants, data types, and operators to develop web-based programs.
4. Implement control structures (conditional and looping statements) to solve real-world programming problems in PHP.
5. Develop reusable programs using user-defined functions with parameters and return values.
6. Create and manipulate different types of arrays (indexed, associative, and multidimensional) in PHP applications.

There will be minimum 20 practicals based on PHP

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Cloud Computing

Course Outcomes:

After completion of this course students will be able to:

1. Acquire knowledge of cloud computing and its usage.
2. Understand components and operations of cloud computing system.
3. Understand the concept of Virtualization and design of cloud Services
4. Identify major cloud service providers and evaluate the advantages and challenges of cloud computing in real-world applications.
5. Describe the concept of virtualization, its architecture, design requirements, benefits, and challenges in computing systems.
6. Analyze different types and levels of virtualization, including CPU, memory, I/O, and server virtualization, along with hypervisor and virtual machine types.

UNIT- I

(15 Hours)

Fundamentals of cloud computing Evolution of cloud computing, characteristics of cloud computing, need of cloud computing, Components of cloud computing, cloud computing architecture, client server architecture, grid computing environment, Cloud computing vs. Cluster computing, types of cloud, major players in cloud computing, advantages and challenges of cloud computing.

UNIT- II

(15 Hours)

Virtualization Virtualization architecture and its needs, benefits and challenges, types of virtualization, Levels of Virtualization Implementation, virtualization of CPU, Memory and I/O devices, server virtualization, virtualization design requirements, virtualization structure, open source virtualization technology, Pros and cons of virtualization. Hypervisor, Virtual Machine Types, load balancing, Examples of cloud services- Microsoft azure, Google cloud, VMware, Amazon EC2.

References

1. Cloud Computing For Dummies by Judith Hurwitz
2. Cloud Computing: From Beginning to End by Mr Ray J Rafaels
3. Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More by Kris Jamsa
4. Virtual Machine in Cloud Computing by Manan Shah, Charusmita Shah

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Basics of AI Tools

Course Outcomes:

After completion of this course students will be able to:

1. Explain the fundamental concepts of Artificial Intelligence and identify commonly used AI tools and platforms.
2. Demonstrate the use of basic AI tools for tasks such as text generation, image creation, data analysis, and automation.
3. Apply AI tools for problem-solving in areas such as education, business, communication, and productivity.
4. Analyze the benefits, limitations, and ethical considerations of using AI tools in real-world applications.
5. Utilize AI-powered platforms for content creation, coding assistance, data processing, and decision-making tasks.
6. Develop simple AI-assisted projects by integrating multiple AI tools to enhance efficiency and innovation.

Minimum 20 AI tools needs to be explored

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

AEC-III: Corporate Culture & Communication

Course Outcomes:

After completion of this course students will be able to:

1. Develop effective professional communication skills
2. Understand organizational and cross-cultural workplace behavior
3. Enhance ethical, digital, and AI-era communication competence.
4. Prepare students for corporate and global work environments.
5. Communicate effectively in professional environments.
6. Draft business documents and reports.

UNIT I

(15 Hours)

Business Communication: Introduction to Business Communication: Meaning and definition of business communication, Objectives and importance in organizations. Types: internal; external communication, Role of communication in AI-driven businesses. Communication Process and Models: Elements of communication process, Models of Communication Cycle, Characteristics of Professional communication, Barriers to communication, Overcoming communication barriers. Verbal and Non-Verbal Communication: Verbal communication: oral and written Non-verbal communication: body language, kinesics, proxemics, Paralanguage and visual communication –Impact of non-verbal cues in professional settings. Written Business Communication: Principles of effective business writing. Business letters: inquiry, complaint, adjustment, Emails, memos, notices, Report writing: short reports and summaries AI tools in business writing (email drafting, grammar tools), Oral Communication; Presentation Skills: Meetings: types and conduct, Interviews: preparation and participation, Public speaking and presentation skills, Use of visual aids and AI presentation tools

UNIT II

(15 Hours)

Business Culture and Professional Ethics: Concept of Culture in Business: Meaning and elements of culture Organizational culture: types and significance, Corporate culture in technology-based organizations, Cultural diversity in the workplace Cross Cultural Communication: High-context and low-context cultures, Hofstede's cultural dimensions Cross-cultural challenges in global business, Communication in multicultural teams, AI and globalization of workplace communication. Professional Ethics and Corporate Etiquette: Meaning and importance of business ethics, Ethical issues in communication, Corporate etiquette: workplace behavior, dress code, Email, meeting, and virtual etiquette, Ethics in AI communication and data usage. Digital Communication and AI Workplace Culture: Digital communication tools and platforms, Social media communication for business, Remote work culture and virtual collaboration, Impact of AI on organizational communication, Future trends in business communication.

Reference Books:

1. Bovee, C. L. & Thill, J. V. Business Communication Today
2. Lesikar, R. V. Business Communication: Theory and Application

3. Hofstede, G. Cultures and Organizations
4. Guffey, M. E. Business Communication: Process and Product

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

On Job Training (OJT)

Course Outcomes:

After completion of this course students will be able to:

1. Apply theoretical knowledge gained during the academic program to real-world industrial or organizational tasks.
2. Demonstrate professional work ethics, discipline, time management, and responsibility in a workplace environment.
3. Develop technical and practical skills relevant to the specific industry or domain of training.
4. Exhibit effective communication, teamwork, and interpersonal skills while working with professionals.
5. Analyze workplace problems and propose practical solutions using appropriate tools and methodologies.
6. Prepare a comprehensive training report and present learning outcomes, reflecting on professional growth and career readiness.

Guidelines provided by Shivaji University will be followed.

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Basics of JavaScript

Course Outcomes:

After completion of this course students will be able to:

1. Understand the role of JavaScript in web development.
2. Apply conditional statements and looping constructs to develop logical and efficient JavaScript programs for problem solving.
3. Manipulate arrays and objects and access HTML elements using DOM methods.
4. Implement event handling mechanisms to create interactive and responsive client-side web applications.
5. Develop reusable and modular code using JavaScript functions.
6. Demonstrate object-oriented programming concepts in JavaScript.

UNIT-I

(15 Hours)

JavaScript Introduction, Fundamentals, Variable, Operators, Data types (String, Number, Boolean, Object, Array, etc.), Operators and expressions, If-else statements, Switch-case, Loops (for, while, do-while), Arrays and Objects, Accessing elements with getElementById, querySelector, Event handling

UNIT-II

(15 Hours)

JavaScript Functions, JavaScript Function Expression, Error Handling, Constructor functions, Object-Oriented Programming (OOP) in JavaScript, JavaScript Classes, JavaScript Inheritance, JavaScript Prototype, JavaScript this Keyword, JSON in JavaScript, Modules in JavaScript, Regular Expressions, Date and time, Math object

Reference Books:

1. HTML, CSS, and JavaScript All in One by Meloni and Kyrin's
2. Head First JavaScript: A Brain-Friendly Guide by Eric Freeman & Elizabeth Robson

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Advanced Python Programming

Course Outcomes:

After completion of this course students will be able to;

1. Explain how to store, access, and modify data using Python Lists.
2. Use loops to process data in lists and strings, and implement reading techniques.
3. Utilize different Python collection types such as Sets, Tuples, and Dictionaries.
4. Compare the characteristics and use cases of Lists, Tuples, Sets, and Dictionaries.
5. Apply object-oriented concepts to build basic Graphical User Interfaces (GUIs) in Python.
6. Implement GUI applications with customized widgets.

UNIT -I

(15 Hours)

Storing Collections of Data Using Lists: storing and accessing data in Lists, modifying Lists, operations on Lists, slicing Lists, aliasing, List Methods, Working with a List of Lists. Repeating code using loops: processing items in a List, processing characters in Strings, Looping over a range of numbers, processing Lists using Indices, reading techniques, multiline Records.

UNIT -II

(15 Hours)

Storing data using other collection Types: storing data using Sets, storing data using Tuple, storing data using Dictionaries, Inverting a Dictionary, Comparison of List, Tuple, Set and Dictionary, Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Widgets, Object-Oriented GUIs, Regular expressions.

Reference Books:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul ries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf
2. Python for Informatics: Exploring Information, Charles Severance
3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Basics of JavaScript Lab

Course Outcomes:

After completion of this course students will be able to:

1. Apply fundamental JavaScript concepts such as variables, data types, operators, control structures, and functions to develop interactive web-based programs.
2. Design dynamic web pages using JavaScript with event handling, DOM manipulation, form validation, and basic client-side scripting techniques.

There will be minimum 20 practicals based on Basics of JavaScript

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Advanced Python Programming Lab

Course Outcomes:

After completion of this course students will be able to:

1. Implement advanced Python programming concepts including object-oriented programming (classes, inheritance, polymorphism), modules, and exception handling.
2. Develop Python applications using advanced data structures (lists, tuples, dictionaries, sets) and file handling techniques.
3. Apply Python libraries and packages to solve real-world problems involving data processing, automation, or simple application development.
4. Integrate problem-solving skills to build small-scale projects combining JavaScript for frontend interaction and Python for backend or computational logic.

There will be minimum 20 practicals based on Advanced Python Programming

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Back End Development

Course Outcomes:

After completion of this course students will be able to:

1. Understand NoSQL Fundamentals
2. Develop Proficiency in JSON-Based Data Modeling
3. Apply CRUD Operations in MongoDB
4. Implement Advanced Querying and Indexing Techniques
5. Manage MongoDB Databases and Users
6. Understand Internal Operations and Scalability Features

UNIT-I

(15 Hours)

Introduction to MongoDB (No-sql), Difference between NoSQL and RDBMS, Benefits of NoSQL, Objectives, Design Goals, The Mongo Shell, JSON Introduction, JSON Structure, Collections in MongoDB, Documents In mongoDb, Inserting data into database, Filter queries in MongoDB Database, Schema Validation in MongoDB database, Indexing In collections, Aggregation in MongoDB, Embedded Document in MongoDB

UNIT-II

(15 Hours)

Inset Documents, Update Documents, Delete Documents, Query Documents, SQL to MongoDB Mapping, MongoDB text search, Partial Updates & Document Limits, Removing Documents, Multi Update, Upsert, Wire Protocol, Bulk() Operations and Methods, Common Commands, db.runCommand(), db.isMaster(), db.serverStatus(), db.currentOp() & db.killOp(), collection.stats() & collection.drop() MongoDB Shell, MongoDB Shell, Shell Collection Methods, Cursor Method, MongoDB Database Commands, Query Plan Cache Methods, User Management Method, Role Management Method, MongoDB Replication Methods

Reference Books:

1. MongoDB Basics, by Peter Membrey , David Hows, et al., 2014
2. MongoDB Essentials by Ranjeet Jha, 2025

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Advanced PHP

Course Outcomes:

After completion of this course students will be able to:

1. Design and process dynamic HTML forms using PHP,
2. Develop database-driven web applications by connecting PHP with MySQL
3. Apply Object-Oriented Programming (OOP) concepts in PHP by creating classes, objects, attributes, constructors, destructors, static methods, abstract classes, and inheritance.
4. Implement session and cookie management techniques to maintain state and user authentication
5. Apply error handling and exception handling mechanisms
6. Integrate form handling, database connectivity

UNIT-I

(15 Hours)

Handling HTML forms with PHP: HTML forms work, capture form data with PHP, multi value fields, web forms with PHP, storing PHP variables in forms, create file upload forms, redirecting in PHP, working with files. Introduction to MySQL databases, Connecting PHP to a MySQL database. PHP CRUD with MYSQL

UNIT-II

(15 Hours)

Object Oriented Concepts, Define Class, Class Attributes, Creating an Object, constructors and destructors, Static Method, Abstract Class, Inheritance, Error handling, Exception handling in PHP. Working with sessions and cookies.

Reference Books:

1. Matt Doyle, Beginning PHP 5.3, Wiley India Edition, 2012 .
2. PHP6 and MySQL, Steve Suchring, Tim Converse and Joyce Park, Wiley India 2010, Second Edition.
3. Vikram Vaswani, PHP: A Beginners guide, Tata Mcgraw Hill, 2009.
4. Core PHP Programming” by Atkinson Leon, Suraski Zeev, Pearson Publication
5. Larry Ullman, PHP 6 and MySQL 5, Pearson Education, 2008.
6. Laravel: Up & Running: A Framework for Building Modern PHP Apps by Matt Stauffer Oreilly.

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Back End Development LAB

Course Outcomes:

After completion of this course students will be able to:

1. Develop server-side applications using backend programming languages to handle client requests and generate dynamic web content.
2. Design and implement database-driven applications by integrating backend technologies with relational databases (MySQL/PostgreSQL).
3. Implement CRUD (Create, Read, Update, Delete) operations for managing structured data in web applications.
4. Apply authentication, session management, and security mechanisms to develop secure backend systems.
5. Develop RESTful APIs and handle data exchange using JSON for frontend-backend communication.
6. Integrate backend logic, database connectivity, and API services to build complete functional web applications or mini projects.

There will be minimum 20 practicals based on Back End Development

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Advanced PHP LAB

Course Outcomes:

After completion of this course students will be able to:

1. Develop dynamic web applications using advanced PHP features including form handling, file uploads, and server-side validations.
2. Implement database-driven applications using PHP and MySQL with secure CRUD operations and prepared statements.
3. Apply Object-Oriented Programming (OOP) concepts in PHP such as classes, objects, inheritance, abstract classes, and static methods in real-time applications.
4. Design and implement authentication systems using sessions, cookies, and secure password handling techniques.
5. Handle errors and exceptions effectively to build robust and secure PHP applications.
6. Integrate advanced PHP concepts, database connectivity, and state management techniques to develop complete, scalable web-based projects.

There will be around 25-30 programs based on Major Practical II Advanced PHP Lab

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM V (Level- 5.5)

Advanced AI Tools

Course Outcomes:

After completion of this course students will be able to:

1. Explain the concepts, architecture, and applications of advanced AI tools and platforms used in modern industries.
2. Apply AI development tools and frameworks to build intelligent models for classification, prediction, and data analysis tasks.
3. Utilize AI libraries and platforms (such as machine learning and deep learning frameworks) for model training, evaluation, and deployment.
4. Implement AI tools for automation, natural language processing, computer vision, and data-driven decision-making applications.
5. Evaluate the performance, ethical considerations, and limitations of AI tools in real-world scenarios.
6. Design and develop practical AI-based solutions or mini projects using advanced AI tools and platforms.

Minimum 20 AI tools will be explored

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Cyber Security

Course Outcomes:

After completion of this course students will be able to:

1. Analyze the fundamental concepts of cyber security
2. Identify various cyber security threats such as viruses, worms, Trojan horses, ransomware
3. Apply security practices for protecting data, mobile devices, browsers, emails, files
4. Understand cryptography concepts including encryption, decryption, symmetric and asymmetric key cryptography, and digital signatures for secure communication.
5. Describe digital forensics processes, e-commerce security and wireless network security
6. Demonstrate awareness of cyber crimes, cyber terrorism and security policies

UNIT- I

(15 Hours)

Introduction to Cyber Security Cyber Security: Definition, Importance, cyber security fundamentals: confidentiality, Integrity, availability, layers of cyber security, Cyber Warfare- Cyber terrorism-Cyber Espionage, Cyber Hygiene & Security, Cyber Security Vulnerabilities and Cyber Security Safeguards: Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Weak Authentication, Poor Cyber Security Awareness, Zero Trust Security, Wi-Fi Attacks, Security Threats: Definition, Types of Threats - Virus, Worms, Trojan Horse, Malware, Ransomware, Identity theft etc

UNIT -II

(15 Hours)

Cryptography, Symmetric and asymmetric key cryptography, Encryption, Decryption, Digital Signature. Digital forensics, lifecycle of digital forensics, E-commerce Security, dimensions of E-commerce security, Security protocols, Computer Forensics, Wireless Network Security- Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall. Cyber crime: Introduction, Causes of cyber crime, cyber terrorism.

Reference Books:

1. William Stallings – Cryptography and Network Security, Pearson Education.
2. Nina Godbole and Sunit Belapure – Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India.
3. Charles P. Pfleeger and Shari Lawrence Pfleeger – Security in Computing,
4. Joseph Migga Kizza – Guide to Computer Network Security, Springer.
5. Eric Maiwald – Fundamentals of Network Security, McGraw-Hill.
6. Atul Kahate – Cryptography and Network Security, Tata McGraw-Hill.

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

AEC IV: Professional Ethics & Corporate Skills

Course Outcomes:

After completion of this course students will be able to:

1. Explain the fundamental concepts of professional ethics, moral values, and codes of conduct relevant to corporate and professional environments.
2. Analyze ethical dilemmas using structured ethical decision-making frameworks, considering bias, empathy, and conflicts of interest.
3. Apply philosophical and psychological approaches to evaluate ethical behavior, integrity, courage, and emotional intelligence in professional life.
4. Assess ethical issues related to research, academics, intellectual property, confidentiality, employee rights, and workplace diversity.
5. Evaluate professional responsibilities related to safety, risk management, environmental protection, and sustainable development.
6. Demonstrate ethical leadership and corporate skills by analyzing CSR and sustainability case studies in national and global business contexts.

UNIT- I

(15 Hours)

Foundations of Ethics, Meaning and scope of ethics, Morals, values, and ethics: personal and professional, Individual vs professional ethics, Sense of professional and engineering ethics, Code of professional conduct (with reference to National Society of Professional Engineers), Ethical Decision Making, Ethical dilemmas and moral reasoning, Ethical decision-making models and roadmap, Bias, empathy, and internal obstacles, Conflict of interest and cultural relativism.

UNIT- II

(15 Hours)

Business Ethics and Corporate Behaviour, Philosophical approaches to business ethics, Ethical issues in business and organizations, Ethical leadership and corporate governance, Resisting unethical authority and domination, Global business ethics, Psychological and Professional Perspectives, Psychological and philosophical approaches to ethics, Myths about morality, Courage, integrity, emotional intelligence, Ethics in research and academics: academic integrity and intellectual honesty, Ethics in the Workplace, Ethical issues in diverse workplaces, Employee rights, confidentiality, and discrimination, Sustainability and Corporate Skills, Ecology, engineering, and economy, Risk-benefit analysis and risk reduction, Corporate Social Responsibility (CSR), CSR in India and corporate sustainability

Reference Books:

1. Subramanian.R. Professional Ethics, Oxford Publication, 2013.
2. Nagarasan. R.S. Professional Ethics and Human Values. New Age International Publications
3. Mike W Martin and Roland Schinzinger, Ethics in Engineering, 4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi, 2014

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

IKS for Computer Science

Course Outcomes

After completing the course, students will be able to:

1. Explain core concepts and philosophy of Indian Knowledge Systems
2. Relate ancient Indian logic and mathematics to modern computer science
3. Apply IKS-inspired algorithms in computational problem-solving
4. Analyze the role of Sanskrit grammar in NLP and AI
5. Design ethical and sustainable AI systems using IKS principles
6. Evaluate real-world case studies integrating IKS with modern technology

UNIT -I

(15 Hours)

Definition and scope of Indian Knowledge Systems, Importance of ancient knowledge in contemporary science and technology, The IKS corpus: Vedas, Upanishads, Smritis, Sutras, Shastras, Objectives, nature, scope, and unique characteristics of IKS, Unique number representation systems: Bhūta Saṃkhya System, Kaṭapayādi System, Pingala's binary system (Laghu–Guru) and its importance in computing, Sanskrit phonetics and linguistics, Panini's Ashtadhyayi, Algorithmic nature of Paninian grammar, Role of Sanskrit in computational linguistics, Morphological analysis and syntax parsing.

UNIT- II

(15 Hours)

Applications: POS tagging, Machine translation, AI-driven language models for Indian languages, Knowledge pyramid and epistemology in IKS, Nyaya logic in knowledge representation, Pramana, Prameya, Samsasya as AI reasoning models, Ethical AI inspired by Indian philosophy, Sustainable and socially responsible AI systems Case Studies: Compiler Design, Recursion, Encryption Decryption, Computer Graphics, Algorithm Time Complexity, Binary Combinations, Vedic Mathematics for Signal

Processing, Paninian Grammar for NLP and AI language models, Machine Learning inspired by Nyaya Logic

References

1. Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru.
2. Bhartiya Knowledge Systems by M.C. Bora, Khanna Publishing House

3. Kautilya The Arthashastra. Translated by R. Shamasastri
4. Kapoor, Kapil, and Singh Avadesh Kumar, Indian Knowledge System Vol.1, DK Print World, Ltd., 2005.
5. Mahadevan B., Bhat V R, Nagendra Pavana R.N., Indian Knowledge System Concepts and Application, PHI Learning Pvt. Ltd., 2022.

Bachelor of Computer Applications (BCA)

Multiple Entry and Multiple Exit Option (NEP-2020)

PART III SEM VI (Level- 5.5)

Field Project (FP)

Course Outcomes:

After completion of this course students will be able to:

1. Identify real-world problems in industry, community, or research environments and define clear project objectives.
2. Apply theoretical knowledge and practical skills acquired during the program to solve field-based problems.
3. Collect, analyze, and interpret data using appropriate tools, techniques, and methodologies.
4. Demonstrate teamwork, leadership, communication, and professional ethics while working in real-time project environments.
5. Prepare structured project reports and deliver effective presentations showcasing findings, outcomes, and recommendations.
6. Evaluate project outcomes critically and suggest improvements or future enhancements based on practical experience.

Common Guidelines will be provided by Shivaji University, Kolhapur