



Vitthalbhai Patel & Rajratna P. T. Patel Science College (Autonomous)

(Reaccredited with 'A' Grade by NAAC (CGPA 3.14))

Affiliated to SARDAR PATEL UNIVERSITY Vallabh Vidyanagar, Gujarat

Syllabus effective from the Academic Year 2026-2027



Course Structure under NEP - 2020 BCA (Bachelors of Computer Applications) Semester-V

PROGRAMME SPECIFIC OBJECTIVE:

The objective of the BCA programme is to prepare students for a career in software design, development and testing as well as IT support by training them in the core and emerging areas of computer applications.

Subject	Course No.	Subject Title	Theory/ Practical	Credits	Weekly Contact Hours	Exam Duration (Hrs.)	Marking Scheme		
							Int.	Ext.	Tot.
Discipline Specific Course Core (Major)	US05MABCA01	Computer Networks	T	4	4	2:30	50	50	100
	US05MABCA02	Visual Programming	T	4	4	2:30	50	50	100
	US05MABCA03	Practical based on US05MABCA02	P	4	8	3:00	50	50	100
Minor	US05MIBCA04	Python Programming	T	2	2	1:30	25	25	50
	US05MIBCA05	Practical based on US05MIBCA 04	P	2	4	1:30	25	25	50
	US05MIBCA06	Object Oriented Programming - II	T	2	2	1:30	25	25	50
	US05MIBCA07	Practical based on US05MIBCA 06	P	2	4	1:30	25	25	50
Skill Enhancement Course/Internship/ Dissertation	US05SEBCA08	Introduction to Artificial Intelligence	T	2	2	1:30	25	25	50
		Total		22					



BCA (Bachelor of Computer Applications)
BCA (Semester–V)

Course Code	US05MABCA01	Title of the Course	Computer Networks
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To understand the basic concepts of computer networks and data communication. 2. To acquire knowledge of basic concepts related to network protocols and standards. 3. To learn fundamentals of wireless networking.
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Course Content		
Unit	Description	Weightage (%)
1.	Introduction – Computer networks : definition, advantages-disadvantages – Classification of computer networks – Categories of computer network : local area networks, metropolitan area networks, wide area networks – Uses of Computer Network – Meaning of the basic terms : topology, data rate, modulation rate, spectrum, bandwidth, server, host	25
2.	Data Communication Fundamentals – Various types of transmission media – Guided transmission media: magnetic media, twisted pair, coaxial cables, fiber optics – Introduction to the concept of modulation, Types of modulation – Serial transmission vs. Parallel transmission – Circuit switching, packet switching, message switching – Concept of multiplexing: frequency division multiplexing, time division multiplexing	25
3.	Layered Protocols and Satellite Communication – Protocol significance and hierarchies – Design issues for the layers – The OSI reference model – Examples of protocols for different layers of the OSI model – Introduction communication satellites and categories (LEO, MEO, GEO)	25



4.	Introduction to Wireless Networks and Networking Devices – Introduction to wireless networks: Bluetooth – LAN topologies with advantages and disadvantages: bus, star, ring, tree, mesh – Introduction to carrier sense multiple access (CSMA), carrier sense multiple access with collision detection (CSMA/CD) protocol for LAN – Functions of various network connecting devices: modems, amplifiers, repeaters, hubs, switches, bridges, routers, gateway	25
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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	ability to describe the significance and functioning of computer networks.
2.	understanding of the fundamental concepts related to data communication.
3.	knowledge of various network protocols and standards.
4.	knowledge of basic concepts related to wireless networking.



Suggested References:

Sr. No.	References
1.	Tanenbaum A. S., computer networks, 3rd edition prentice-hall of India Pvt. Ltd., New Delhi, 1997.
2.	Behrouz Forouzan, introduction to data communications and networking, Tata McGraw-hill publishing co. Ltd., New Delhi, 4th edition, 1998.
3.	Stallings W., Data and Computer Communications, 3rd edition, Macmillan Pub. Company, New York, 1991.



BCA (Bachelor of Computer Application)

BCA (Semester-V)

Course Code	US05MABCA02	Title of the Course	Visual Programming
Total Credits Of the Course	4	Hours per Week	4

Course Objectives:	1. To understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic. 2. To describe the basic structure of a Visual Basic .NET project and use main features of the Integrated Development Environment (IDE). 3. To understand how to create applications using Microsoft Windows Forms. 4. To understand Exception handling. 5. To understand and create applications that use ADO.NET
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Course Content		
Unit	Description	Weightage (%)
1.	Introduction to .NET Framework (4.5) and VB.NET – .NET Architecture – .NET Languages, Microsoft Intermediate Language (MSIL) – The Just-In-Time (JIT) compiler – Working with Assemblies – The .NET framework class library VB.NET, introduction, applications and types of project Introduction to Visual Studio IDE – Creating simple Windows Application using VB.NET Variables, data types, constants and operators – Type casting, Boxing and Unboxing – Working with arrays and strings Creating simple Windows Application using VB.NET	25
2.	Fundamentals of VB.NET – VB.NET Basics, Use of conditional statement (if), Multi branching statement (select) and With...End With statement – Looping Statement: DO, FOR, FOR EACH..NEXT and WHILE, Working with EXIT, CONTINUE and WITH statements – Working with procedures – introduction, types, use of parameters, parameter passing, calling procedures – OOP concepts - Encapsulation, Inheritance – Interfaces and Polymorphism, working with modules, classes (partial) and namespaces – Working with Windows Forms – introduction, life cycle, basic	25



	properties, methods and events, use of simple windows forms	
	control. – Working with SDI and MDI forms	
3.	Developing Windows Forms, Exception Handling – Working with basic controls – Button, CheckBox, CheckedListBox, ComboBox, DateTimePicker, GroupBox, HScrollBar, RadioButton, VScrollBar, Label, ListBox, PictureBox, TextBox and Time controls. – Working with advanced controls – LinkLabel, RichTextBox, ColorDialog, FontDialog, TreeView, Error Provider Control – Working with modules, classes (partial) and namespaces Error Handling: exception, structured exception using try...catch and final statement	25
4.	Database with ADO.NET – Persisting Data Using Databases and Files – ADO.NET –introduction and applications – ADO.NET – architecture (connected and disconnected) – Database connectivity using ADO.NET Use of Data sources, – Server Explorer and working with DataSet, Populating data in a DataGridView – Working with report	25

Teaching- Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%



Course Outcomes: Having completed this course, the learner will be able to understand	
1.	The .NET Framework and describe some of the major enhancements to the new version of Visual Basic.
2.	The basic structure of a VisualBasic .NET project and use main features of the integrated development environment (IDE).
3.	How to create applications using Microsoft Windows Forms.
4.	The basic concepts related to Exception handling.
5.	How to develop applications that use ADO.NET.

Suggested References:	
Sr.No.	References
1.	Steven Holzner; VB.NET Black Book by Dreamtech publication, 2005.
2.	Francesco Balena : Programming Microsoft Visual Basic.NET, Microsoft Press, 2003.
3.	Bill Evjen, BillyHollis, Bill Sheldon, KentSharkey and Tim McCarthy: Professional VB 2005 with .NET 3.0, 2007.

On-line resources to be used if available as reference material	
On-line Resources	
1.	https://www.tutorialspoint.com/
2.	https://www.w3schools.com/
3.	https://www.javatpoint.com/



BCA (Bachelor of Computer Application)

BCA (Semester-V)

Course Code	US05MABCA03	Title of the Course	Practical based on US05MABCA02
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	1. To understand .NET technology and describe some of the major enhancements to the new version of Visual Basic. 2. To describe the basic structure of a Visual Basic .NET project and use main features of the Integrated Development Environment (IDE). 3. To understand how to create applications using Microsoft Windows Forms. 4. To understand Exception handling. 5. To understand and create applications that use ADO.NET
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Course Content		
	Description	Weightage (%)
	Practical based on Programming Fundamentals Using Visual Basic .NET	100%

Teaching-Learning Methodology	Practical-based learning in small groups and Hands on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%



~~Course Outcomes: Having completed this course, the learner will be able to understand~~

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|----|--|
| 1. | the basic structure of a VisualBasic .NET project and use main features of the integrated development environment (IDE). |
| 2. | how to create applications using Microsoft Windows Forms and Exception Handling |



BCA (Bachelor of Computer Applications)

BCA (Semester-V)

Course Code	US05MIBCA04	Title of the Course	Python Programming
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	1. To learn the fundamentals of the Python programming language. 2. To study the concepts of object-oriented programming using Python. 3. To learn exception handling in Python.
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Course Content		
Unit	Description	Weightage (%)
1.	Basic Python – Python Overview, Features of Python, Differences among C, JAVA and Python – Applications of Python, Programming Structure of Python – Introduction to Python Libraries (NumPy, Pandas, Matplotlib, etc.) – Python Environment Setup, Basic Syntax of Python, Python Data types, Python variables, Casting, Operators, Comments, – User Input, Decision making and Branching, Looping, Range, List and Tuple, Set and Dictionary, Strings and basic operations	50
2.	Advanced Python – Concept of Class, Object and Instances, Constructor, class attributes and destructors, Functions, Scope, Iterators – Inheritance, method overloading and overriding in Python, concepts of Modules, Lambda function – Debugging, Python Error with its Types, Exception handling in Python.	50

Teaching-Learning Methodology	Blended learning approach incorporating traditional classroom teaching and online /ICT-based teaching practices.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to develop

1.	ability to develop computer programs using the Python programming language.
2.	knowledge of manipulating different Python data types.
3.	ability to develop object-oriented programs using Python.
4.	basic knowledge of exception handling.

Suggested References:

Sr. No.	References
1.	John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India, 2016.
2.	Wesley J. Chun. "Core Python Programming -Second Edition", Prentice Hall, 2006.
3.	Learning Python: By Mark Lutz, David Ascher, 2009
4.	Exploring Python Book by Timothy Budd, 2011.
5.	Head First Python: A Brain-Friendly Guide by Aul Barry, 2016.
6.	Introducing Python -Modern Computing in Simple Packages – Bill Lubanovic, O'Reilly Publication, 2014.

On-line resources to be used if available as reference material

1.	https://www.w3schools.com/python
2.	https://www.tutorialspoint.com/python



BCA (Bachelor of Computer Application)

BCA (Semester-V)

Course Code	US05MIBCA05	Title of the Course	Practical based on US05MIBCA04
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	1. To learn the fundamentals of the Python programming language. 2. To study the concepts of object-oriented programming using Python. 3. To learn exception handling in Python.
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Course Content		
	Description	Weightage (%)
	Practical Based on Programming Fundamentals of Python	100%

Teaching-Learning Methodology	Practical-based learning in small groups and Hands on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	ability to implement computer programs using the Python programming language.
2.	ability to implement object-oriented programs using Python.



BCA (Bachelor of Computer Applications)

BCA (Semester-V)

Course Code	US05MIBCA06	Title of the Course	Object Oriented Programming - II
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	1. To study the fundamental concepts related to Servlet, Multi-threading. 2. To acquire knowledge about basic concepts and implementation of JSP.
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Course Content		
Unit	Description	Weightage (%)
1.	Servlet – Introduction – Types of servlets – Life cycle of servlet – Introduction to Session Tracking and Cookie Multi-threading – Introduction – Thread Life Cycle – Creating Thread – Introduction to Thread Methods and Thread Synchronization	50
2.	Java Server Pages (JSP) – Introduction to JSP and Lifecycle – Components of JSP – Directives, Tags, Scripting Elements – Execution process of JSP Application – Building a simple application using JSP	50

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classrooms teaching as well as usage of ICT tools.
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Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to understand

1.	the concept of Servlet and execution of multi-processing using multithreading environment
2.	web application development using JSP.

Suggested References:

Sr. No.	References
1.	The Complete Reference – JAVA Herbert Schildt, 2017.
2.	Core Java –II By Cay S. Horstmann and Gary Cornell, 2020.
3.	Compete Reference J2EE – Jim Keogh, 2017.
4.	Programming with Java- A Primer by E. Balagurusamy, 3rd Edition, TMH, 2007.



BCA (Bachelor of Computer Application)

BCA (Semester-V)

Course Code	US05MABCA07	Title of the Course	Practical based on US05MIBCA 06
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	1. To study the fundamental concepts related to Servlet, Multi-threading. 2. To acquire knowledge about basic concepts and implementation of JSP.
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Course Content		
	Description	Weightage (%)
	Practical Based on Programming Fundamental Using Java	100%

Teaching-Learning Methodology	Practical-based learning in small groups and Hands on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to implement	
1.	the concept of Servlet and multi-processing using multithreading environment
2.	web application using JSP.



BCA (Bachelor of Computer Applications)

BCA (Semester-V)

Course Code	US05SEBCA08	Title of the Course	Introduction Artificial Intelligence
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	1. To introduce the term Artificial Intelligence and its related domains. 2. To study basic concepts related to KBS. 3. To learn various search methods.
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Course Content		
Unit	Description	Weightage (%)
1.	Artificial Intelligence (AI) – Concepts and Definitions of AI – Brief history of AI – Introduction to their related fields like Expert Systems, Natural Language Programs, Robotics, Machine Learning, Speech Recognition, Neural Networks, etc – Application Areas of Artificial Intelligence Search Algorithms in AI: – Blind search (Breadth-first search and Depth-first search) – Heuristic search algorithms (Greedy Search and A* Search)	50
2.	Knowledge Based Systems (KBS) – KBS Structure, Components of KBS, Categories of KBS, – Knowledge-Based Shell – Advantages, limitations and applications of KBS – Knowledge Acquisition, Knowledge Update – Factual and Procedural Knowledge Representations – Knowledge Based Systems Development Model	50

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classrooms teaching as well as usage of ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3) Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to understand	
1.	the term Artificial Intelligence and its related domains.
2.	basic concepts related to KBS.
3.	various search methods.

Suggested References:	
Sr. No.	References
1.	Elain Rich : Artificial Intelligence, McGraw Hill, 2001.
2.	Patterson, Dan W. : Introduction to Artificial Intelligence, Prentice Hall of India (PHI), 2015.
3.	R.Akerkar : Introduction to Artificial Intelligence, PHI, 2005.
4.	Rich and Knight, Artificial Intelligence, Tata McGraw Hill Publishing Co. Ltd., 21 st Indian Reprint, 2001.
5.	Akerkar RA and Sajja P S, Knowledge-Based Systems, Jones & Bartlett Publishers, Sudbury, MA, USA, 2009.
