## Bachelor of Science (Computer Applications & Information Technology)
## B.Sc. (CA & IT)
## Semester - V

| Course Code | **US05MACIT01** | Title of the Course | **Fundamentals of Computer Networks** |
|---|---|---|---|
| Total Credits of the Course | **4** | Hours per Week | **4** |

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| Course Objectives: | 1. To understand the basic concepts of computer networks and data communication.<br>2. To acquire knowledge of basic concepts related to network protocols and standards.<br>3. To learn fundamentals of wireless networking. |

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

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|---|---|---|
| 4. | **Introduction to Wireless Networks and Networking Devices**<br>– Introduction to wireless networks: Bluetooth<br>– LAN topologies with advantages and disadvantages: bus, star, ring, tree, mesh<br>– Introduction to carrier sense multiple access (CSMA), carrier sense multiple access with collision detection (CSMA/CD) protocol for LAN<br>– 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. |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written Examination (As per CBCS R.6.8.3)<br>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. |

## Bachelor of Science (Computer Applications & Information Technology)
## B.Sc. (CA & IT)
## Semester - V

| Course Code | **US05MACIT02** | Title of the Course | **Visual Programming** |
|---|---|---|---|
| Total Credits Of the Course | **4** | Hours per Week | **4** |

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| Course Objectives: | 1. To understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic.<br>2. To describe the basic structure of a Visual Basic .NET project and use main features of the Integrated Development Environment (IDE).<br>3. To understand how to create applications using Microsoft Windows Forms.<br>4. To understand Exception handling.<br>5. To understand and create applications that use ADO.NET |

| Course Content | | |
|---|---|---|
| Unit | Description | Weightage (%) |
| 1. | **Introduction to .NET Framework (4.5) and VB.NET**<br>– .NET Architecture<br>– .NET Languages, Microsoft Intermediate Language (MSIL)<br>– The Just-In-Time (JIT) compiler<br>– Working with Assemblies<br>– The .NET framework class library VB.NET, introduction, applications and types of project Introduction to Visual Studio IDE<br>– Creating simple Windows Application using VB.NET Variables, data types, constants and operators<br>– Type casting, Boxing and Unboxing<br>– Working with arrays and strings Creating simple Windows Application using VB.NET | 25 |
| 2. | **Fundamentals of VB.NET**<br>– VB.NET Basics, Use of conditional statement (if), Multi branching statement (select) and With…End With statement<br>– Looping Statement: DO, FOR, FOR EACH..NEXT and WHILE, Working with EXIT, CONTINUE and WITH statements<br>– Working with procedures – introduction, types, use of parameters, parameter passing, and procedures<br>– OOP concepts - Encapsulation, Inheritance<br>– Interfaces and Polymorphism, working with modules, classes (partial) and namespaces<br>– Working with Windows Forms – introduction, life cycle, basic properties, methods and events, use of simple windows forms control.<br>– Working with SDI and MDI forms | 25 |

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|---|---|---|
| 3. | **Developing Windows Forms, Exception Handling**<br>– Working with basic controls – Button, CheckBox, CheckedListBox, ComboBox, DateTimePicker, GroupBox, HScrollBar, RadioButton, VscrollBar, Label, ListBox, PictureBox, TextBox and Time controls.<br>– Working with advanced controls – LinkLabel, RichTextBox, ColorDiolog, FontDialog, TreeView, Error Provider Control<br>– Working with modules, classes (partial) and namespaces Error Handling: exception, structured exception using try…catch and final statement | 25 |
| 4. | **Database with ADO.NET**<br>– Persisting Data Using Databases and Files<br>– ADO.NET –introduction and applications<br>– ADO.NET – architecture (connected anddisconnected)<br>– Database connectivity using ADO.NET Use of Data sources,<br>– Server Explorer and working with DataSet, Populating data in a DataGridView<br>– Working with report | 25 |

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| Teaching- Learning Methodology | Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written Examination (As pe r CBCS R.6.8.3)<br>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 |
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| On-line Resources |
| 1. https://www.tutorialspoint.com/ |
| 2. https://www.w3schools.com/ |
| 3. https://www.javatpoint.com/ |

## Bachelor of Science (Computer Applications & Information Technology)
## B.Sc. (CA & IT)
## Semester - V

| Course Code | **US05MACIT03** | Title of the Course | **Practical based on US05MABIT02** |
|---|---|---|---|
| Total Credits of the Course | **4** | Hours per Week | **8** |

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|---|---|
| Course Objectives: | 1. To understand .NET technology and describe some of the major enhancements to the new version of Visual Basic.<br>2. To describe the basic structure of a Visual Basic .NET project and use main features of the Integrated Development Environment (IDE).<br>3. To understand how to create applications using Microsoft Windows Forms.<br>4. To understand Exception handling.<br>5. To understand and create applications that use ADO.NET |

| Course Content | | |
|---|---|---|
| | Description | Weightage (%) |
| | Practical Based on Programming Fundamental Using Visual Basic .NET | 100% |

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|---|---|
| Teaching-Learning Methodology | Practical-based learning in small groups and Hands on training through required ICT tools. |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Practical Examination (As per CBCS R.6.8.3)<br>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 | |
|---|---|
| 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 |

## Bachelor of Science (Computer Applications & Information Technology)
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## Semester - V

| Course Code | **US05MIBIT04** | Title of the Course | **Python Programming** |
|---|---|---|---|
| Total Credits of the Course | **2** | Hours per Week | **2** |

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|---|---|
| Course Objectives: | 1. To learn the fundamentals of the Python programming language.<br>2. To study the concepts of object-oriented programming using Python.<br>3. To learn exception handling in Python. |

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

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|---|---|
| Teaching-Learning Methodology | Blended learning approach incorporating traditional classroom teaching and online /ICT-based teaching practices. |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written Examination (As pe r CBCS R.6.8.3)<br>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 Aaul Barry, 2016. |
| 6 | Introducing P y t h o n -Modern Computing in Simple Packages – Bill Lubanovic, O'Reilly Publication, 2014. |

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

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

## Bachelor of Science (Computer Applications & Information Technology)
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## Semester - V

| Course Code | **US05MICIT05** | Title of the Course | **Practical based on US05MIBIT04** |
|---|---|---|---|
| Total Credits of the Course | **2** | Hours per Week | **4** |

| Course Objectives: | 1. To learn the fundamentals of the Python programming language.<br>2. To study the concepts of object-oriented programming using Python.<br>3. To learn exception handling in Python. |
|---|---|

| 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. |
|---|---|

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Practical Examination (As per CBCS R.6.8.3)<br>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 imlpement computer programs using the Python programming language. |
| 2. | ability to implement object-oriented programs using Python. |

## Bachelor of Science (Computer Applications & Information Technology)
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## Semester – V

| Course Code | **US05MICIT06** | 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.<br>2. To acquire knowledge about basic concepts and implementation of JSP. |
|---|---|

| Course Content | | |
|---|---|---|
| Unit | Description | Weightage (%) |
| 1. | **Servlet**<br>– Introduction<br>– Types of servlets<br>– Life cycle of servlet<br>– Introduction to Session Tracking and Cookie<br>**Multi-threading**<br>– Introduction<br>– Thread Life Cycle<br>– Creating Thread<br>– Introduction to Thread Methods and Thread Synchronization | 50 |
| 2. | **Java Server Pages (JSP)**<br>– Introduction to JSP and Lifecycle<br>– Components of JSP<br>– Directives, Tags, Scripting Elements<br>– Execution process of JSP Application<br>– 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. |
|---|---|

Evaluation Pattern

| Sr. No. | Details of the Evaluation | Weightage |
|---|---|---|
| 1. | Internal Written Examination (As pe r CBCS R.6.8.3)<br>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. |

## Bachelor of Science (Computer Applications & Information Technology)
## B.Sc. (CA & IT)
## Semester - V

| Course Code | **US05MACIT07** | Title of the Course | **Practical based on US05MIBIT 06** |
|---|---|---|---|
| Total Credits of the Course | **2** | Hours per Week | **4** |

| | |
|---|---|
| Course Objectives: | 1. To study the fundamental concepts related to Servlet, Multi-threading.<br>2. To acquire knowledge about basic concepts and implementation of JSP. |

| 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. |

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Practical Examination (As per CBCS R.6.8.3)<br>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. |

## Bachelor of Science (Computer Applications & Information Technology)
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## Semester - V

| Course Code | **US05SECIT08** | Title of the Course | **Basics of Data Science** |
|---|---|---|---|
| Total Credits of the Course | **2** | Hours per Week | **2** |

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|---|---|
| Course Objectives: | 1. To acquire basic knowledge of data science, data analytics and big data.<br>2. To learn development of data science applications using Python and R. |

| Course Content | | |
|---|---|---|
| Unit | Description | Weightage (%) |
| 1. | **Introduction to Data Science Data Analytics**<br>– Data science definition<br>– Need and features<br>– Importance of data science in modern business<br>– Current trends in data science<br>– Analytical techniques<br>– Classification of analytics | 50 |
| 2. | **Big Data and R Studio**<br>– What is data? Types of digital data – structured and unstructured data.<br>– Evolution and definition of big data.<br>– Characteristics of big data.<br>– Introduction to R<br>– Introduction to R Studio<br>– Developing data science applications using Python and R | 50 |

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

| Evaluation Pattern | | |
|---|---|---|
| Sr. No. | Details of the Evaluation | Weightage |
| 1. | Internal Written Examination (As pe r CBCS R.6.8.3)<br>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 gain | |
|---|---|
| 1. | basic knowledge of data science, data analytics and big data |
| 2. | skill to development of data science applications using Python and R |

| Suggested References: | |
|---|---|
| Sr. No. | References |
| 1. | Davy Cielen, Arno D.B. Meysman, Mohamed Ali, Introducing Data Science: Big Data, Machine Learning and More, Using Python Tools, 2016. |
| 2. | Vignesh Prajapati, Big Data Analytics with R and Hadoop – Packrt, 2013. |
| 3. | Mark Lutz, "Learning Python", 4th Edition, O'Reilly, 2009. |
| 4. | Wes McKinney, "Python for Data Analysis", O'Reilly, 2013. |
| 5. | Robert I. Kabacoff, "R in Action: Data Analysis and Graphics with R", Manning, 2011. |

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