BCA V Sem/III Year

Syllabus for the Session 2024-25 (ODD Semester)

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Dot NET Framework with C#	Course Code:		BCA0501T	Type:	Theory
Credits	04			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks			End Term Exam:	70 Marks
⦿ Core	◯ Major	◯ Minor	◯ Elective		◯ Co-curricular	◯ Vocational

Course Objectives	1. To learn the fundamentals of C# programming using Visual Studio. 2. To Use .Net Framework. 3. To Handle Exceptions in C#. 4. To implement Object oriented technology in C#.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Know the basic concept of .NET technology including Common Language Runtime, Common Type System and Base Library.
CO2	Design and develop various programming problems using basic concepts of C#.
CO3	Learn and implement advance programming concepts of C# like Exception Handling, Multi-Threading, Networking and Sockets.
CO4	Create user interactive web pages and data-driven applications using ADO .NET.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	**The .NET Framework:** Introduction, Origin of .NET Technology, .Net Framework Architecture, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, Intermediate language, Just-in- Time Compilation, Garbage Collection, Assemblies, Unified Classes.	15	CO1
Unit 2	**C# Basics:** Introduction, Data Types, Identifiers, Variables & Constants, C# Statements, Reading and Writing through Console [Console Class], Object Oriented Concepts, Use of Ref, Out and Prams Keywords, Boxing and Unboxing, Arrays and Strings.	15	CO2
Unit 3	**C# Using Libraries:** Namespace-System, Exception Handling, Multi-Threading, Versioning, Unsafe Mode, Generic.	10	CO3
Unit 4	**Advanced Features Using C#:** Web Services, Windows Services, **Windows Form:** The Class Hierarchy of Windows Forms, The Controls and Components, Life Cycle of Window Application, Web Forms and Web Forms Controls, C# in Web Application, ADO .Net: ADO .NET Data Architecture, Data Provider, Connected and Disconnected Database, Messaging, Reflection, COM.	20	CO4
CO-PO and PSO Mapping			

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2		1	2		2	1		2
CO2	2	1	2	1	2	2	1	2	1	2	1	
CO3	1	2	2				2	1	2	2	2	1
CO4	2	3	3	2	1				2	3	1	

Strong contribution-3,   Average contribution-2 , Low contribution-1,

Suggested Readings:	
Text- Books	1. Shildt, "C#: The Complete Reference", TMH. 2. Fergal Grimes, "Microsoft .Net for Programmers", SPD Book/
Reference Books	1. TonyBaer, Jan D. Narkiewicz, Kent Tegels, "Understanding the .Net Framework", Wrox Reference Publication. Books 2. Shibi Panikkar and Kumar Sanjeev, "C# with .NET Framework", Firewall Media.
e-Learning	• https://learn.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/tutorials/ • https://www.w3schools.com/cs/index.php

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **05** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **01 Marks.** **Section B:** Contains **02** descriptive questions and each question carries 2 marks. **Section C:** Contains **04** descriptive questions out of which **03** questions are to be attempted. Each question carries **05 Marks.** *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Quiz Test	04	Contains **04 descriptive questions.** Each question carries **01** Mark.
Assignment	05	Assignment to be made on topics and instruction given by subject teacher
Presentation	05	Presentation to be made on topics and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Dot NET Framework with C# Lab	Course Code:	BCA0501P	Type:		Practical
Credits	02			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks		End Term Exam:		70 Marks
⦿ Core	○ Major	○ Minor	⦿ Elective	○ Co-curricular		○ Vocational

Course Objectives	1. To write programs for object-oriented programming paradigms and structure of C#. 2. To solve various programming problems in C#. 3. To implement advanced programming concepts like Interface and Exceptions using C#. 4. To apply GUI programming using Windows Forms and ADO.NET.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Create programs using basic C# constructs.
CO2	Develop various programming problems using Arrays and strings.
CO3	Implement C# programs for Exception Handling, Multi-Threading, Networking and Sockets.
CO4	Develop a program for interactive web pages and data-driven applications using ADO .NET
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	• Mid-term Practical Examination: 12 Marks • Experiment –Writing - 05 • Execution of Program - 05 • Practical File Record - 04 • Viva-Voce - 04

Session Details	Topic	Hours	Mapped CO
Unit 1	• A program of Jagged Array. • A program of binary operator over loading • A program using delegation in which addition and subtraction of two integer value possible. • A program-using Interface.	15	CO1
Unit 2	• A program using multi-Threading. • A program using Exception Handling. • A program to display the caption, height of command button into label. • Design a form to take employee/Student information by using basic controls and display the information on the new form. (Use labels, Textbox, List, Radio button, etc.)	15	CO2
Unit 3	• Creating a window form through which user can enter details of employee: empid, empname, basic salary, sex, date of birth, date of joining, designation, total income, total deduction, and gross salary will be calculated automatically. • Also in above program all details of employee will appear in Grid and depending upon the selection particular actual record will appear on the form.	15	CO3

Unit 4	**Web Application**: 8. Create a web site of your name that takes your details as input such as name, address, hobbies, class, collage etc. Use the validator control to validate the information also shows your information. 9. Create an ASP.Net Web page that lists the details of customer from customer"s database table in a sortable Data Grid with paging option. The Data Grid should display three columns; for the customers" ids, names, phone numbers. The user should be able to sort the Data Grid by customer ID. 10. Write an application to create a web service.	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	3	1	2	1				2	2	1	1
CO2	2	2	2	1		2	3	2	1	2	2	2
CO3	3	2	2		2		2	1	2	1	2	2
CO4	2	2	3	2		3	3		2	3		1

Strong contribution-3,   Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. Shildt, "C#: The Complete Reference", TMH. 2. Fergal Grimes, "Microsoft .Net for Programmers", SPD Book/
Reference Books	1. TonyBaer, Jan D. Narkiewicz, Kent Tegels, "Understanding the .Net Framework", Wrox Reference Publication. Books 2. Shibi Panikkar and Kumar Sanjeev, "C# with .NET Framework", Firewall Media.
e-Learning	• https://www.w3resource.com/csharp-exercises/ • https://exercism.org/tracks/csharp/exercises

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **04** practical questions out of which **03** questions are to be attempted. Each question carries **08 Marks**. *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Experiment –Writing	05	Will be decided by subject teacher
Execution of Program	05	Will be decided by subject teacher
Practical File Record	04	Practical file to be made on experiments and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

EU ERA UNIVERSITY

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Python Programming	Course Code:	BCA0502T	Type:		Theory
Credits	04			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks		End Term Exam:		70 Marks

⦿ Core	○ Major	○ Minor	○ Elective	○ Co-curricular	○ Vocational

Course Objectives	1. To introduce the basic concepts of Python programming language. 2. To make students familiar with the algorithmic approach of problem solving in Python language. 3. To solve real world problems by applying the Python Data Structures, Objects, Functions and Modules. 4. To declare and define functions in Python and build practical applications in Python.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Understand the Preliminary Concepts of Programming Language & syntax.
CO2	Design and develop programs in Python language to solve common problems using concept of Data types such as lists, tuples, and dictionaries.
CO3	Define and use Python functions, modules, and packages.
CO4	Create Window based application using Tkinter.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	**Introduction to Python:** Atoms, Identifiers, and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Membership Operator, Identity Operator).	15	CO1
Unit 2	**Creating Python Programs:** Input and Output Statements, Control statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement- if...else, Difference between break, continue and pass). **Structures:** Numbers, Strings, Lists, Tuples, Dictionary.	15	CO2
Unit 3	**Defining Function-** Declaration, definition and calling of functions, Function Arguments-Required arguments-Keyword arguments-Default arguments-Variable length arguments, Recursion. **Classes and objects:** making objects, encapsulating name in a class, managed attributes, inheritance.	15	CO3
Unit 4	**GUI Programming:** Tkinter introduction, **Tkinter Widgets**: Label, Entry, Text, Message, Checkbutton, Radiobutton, Button, Canvas, Geometry Management, PanedWindow, Tkinter examples.	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	1	3	3	2	3	1	3		2	2	1	2
CO2	2	1	2	3		2	1	2	1	1	2	1
CO3	2	2	1	3	2		2	1	2		2	2
CO4	2	1	3	3	1	3			2	3	3	3

Strong contribution-3,   Average contribution-2 ,   Low contribution-1,

Suggested Readings:

Text- Books	1. Learning Python, Written by Mark Lutz and David Ascher. 2. Python Programming: An Introduction to Computer Science, second edition of John Zelle"s Python Programming.
Reference Books	1. Python Essential Reference, David M.0020Beazley. 2. Python for Data Analysis, Wes Mckinney, 1st edition, O"reilly media, 2012.
e-Learning	• https://docs.python.org/3/tutorial/index.html • https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **05** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **01 Marks.** **Section B:** Contains **02** descriptive questions and each question carries 2 marks. **Section C:** Contains **04** descriptive questions out of which **03** questions are to be attempted. Each question carries **05 Marks**. *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Quiz Test	04	Contains **04 descriptive questions.** Each question carries **01** Mark.
Assignment	05	Assignment to be made on topics and instruction given by subject teacher
Presentation	05	Presentation to be made on topics and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Python Programming Lab	Course Code:	BCA0502P	Type:		Practical
Credits	02			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks		End Term Exam:		70 Marks

⦿ Core	○ Major	○ Minor	○ Elective	○ Co-curricular	○ Vocational

Course Objectives	1. To create programs using the basic concepts of Python programming language. 2. To solve real world problems by applying the Python Data Structures, Objects, Functions and Modules. 3. To declare and define functions in Python. 4. To create GUI applications using Tkinter

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Create programs using the basic components of the Python language.
CO2	Develop programs in Python language to implement Data types such as lists, tuples, and dictionaries.
CO3	Design and write programs using functions and demonstrate various types of arguments.
CO4	Demonstrate Window based application using Tkinter.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	1. Program illustrating Classes and Objects. 2. Python Program to Find the Square Root. 3. Python Program to Swap Two Variables. 4. Python Program to Convert Celsius To Fahrenheit. 5. Python Program to check if a Number is Positive, Negative or zero. 6. Python Program to check if a Number is Odd or Even.	15	CO1
Unit 2	1. Python Program to Find the Largest Among Three Numbers 2. Python Program to Check Prime Number 3. Python Program to Print all Prime Numbers in an Interval 4. Python Program to Find the Factorial of a Number 5. Python Program to Find Numbers Divisible by Another Number 6. Python Program to Find Factorial of Number Using Recursion	15	CO2
Unit 3	1. Python Program to Check If a List is Empty 2. Python Program to Concatenate Two Lists.	15	CO3

Unit 4	1. Python Program to Find the Area and Perimeter of the Circle using Class 2. Python Program to calculate simple interest and compound interest using function 3. Python Program to Swap the First and Last Element in a List 4. Python Program to Count Occurrences of Element in List 5. Python Program to Add a Key-Value Pair to the Dictionary 6. Python Program to Count the Frequency of Each Word in a String using Dictionary	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	1	3		1		2	2	1	
CO2	1	2	2	2		1		2	1	1		1
CO3	3	2	2	2			2	1	2		2	
CO4	2	3	3	3	1	2			2	3		2

Strong contribution-3,   Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. Learning Python, Written by Mark Lutz and David Ascher. 2. Python Programming: An Introduction to Computer Science, second edition of John Zelle"s Python Programming.
Reference Books	1. Python Essential Reference, David M.0020Beazley. 2. Python for Data Analysis, Wes Mckinney, 1st edition, O"reilly media, 2012.
e-Learning	• https://www.w3resource.com/python-exercises/ • https://pynative.com/python-exercises-with-solutions/

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **04** practical questions out of which **03** questions are to be attempted. Each question carries **08 Marks**. *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Experiment –Writing	05	Will be decided by subject teacher
Execution of Program	05	Will be decided by subject teacher
Practical File Record	04	Practical file to be made on experiments and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

ERA UNIVERSITY

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Artificial Intelligence	Course Code:	BCA0503T	Type:		Theory
Credits	04			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks		End Term Exam:		70 Marks

○ Core	◉ Major	○ Minor	○ Elective	○ Co-curricular	○ Vocational

Course Objectives	1. To learn the fundamentals of Artificial Intelligence and its associated technologies. 2. To understand various problem solving methods. 3. To get familiar with knowledge representation mechanisms. 4. To know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Know the basic concepts of Artificial Intelligence (AI), its history and key Characteristics.
CO2	Understand various search strategies and problem solving methods.
CO3	Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving.
CO4	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	**Introduction to Artificial Intelligence:** Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence. Characteristics of Intelligent Agents, Typical Intelligent Agents, Problem Solving Approach to typical AI problems.	14	CO1
Unit 2	**Problem solving Methods:** Search Strategies, Uninformed, Informed, Heuristics, Local Search, Algorithms and Optimization Problems, Searching with Partial Observations, Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search, Game Playing, Optimal Decisions in Games, Alpha, Beta Pruning, Stochastic Games.	16	CO2
Unit 3	**Knowledge Representation:** Knowledge Representation: First Order Predicate Logic, Prolog Programming, Unification, Forward Chaining, Backward Chaining, Resolution, Knowledge Representation, Ontological Engineering, Categories and Objects, Events, Reasoning Systems for Categories, Reasoning with Default Information	15	CO3
Unit 4	**Software Agents:** Architecture for Intelligent Agents, Agent communication, Negotiation and Bargaining, Argumentation among Agents, Trust and Reputation in Multi-agent systems, AI applications, Language Models, Information Retrieval, Information Extraction, Natural	15	CO4

Language Processing, Machine Translation, Speech Recognition, Robot, Hardware, Perception, Planning, Moving.

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	1	3	2	1	1	3		1	1	2	2
CO2	2	2	2	1	1	2	1	2	2	2	2	3
CO3	1	2	2	1	2		2	1	2	2	2	2
CO4	2	2	3	2		3		3	3	3	3	3

Strong contribution-3,   Average contribution-2 ,   Low contribution-1,

Suggested Readings:

Text- Books	1. Artificial Intelligence, Elaine Rich and Kevin Knight, McGraw-Hill, 2nd Edition, 1991. 2. Artificial Intelligence – A Modern Approach, Stuart Russell, Peter Norvig, Pearson Education, 3 rd Edition, 2009.
Reference Books	1. Artificial Intelligence: The Basics, Kevin Warwick, Routledge, 1st Edition, 2006.
e-Learning	• https://www.tutorialspoint.com/artificial_intelligence/index.htm • https://onlinecourses.swayam2.ac.in/cec21_cs08/preview

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **05** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **01 Marks.** **Section B:** Contains **02** descriptive questions and each question carries 2 marks. **Section C:** Contains **04** descriptive questions out of which **03** questions are to be attempted. Each question carries **05 Marks.** *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Quiz Test	04	Contains **04 descriptive questions.** Each question carries **01** Mark.
Assignment	05	Assignment to be made on topics and instruction given by subject teacher
Presentation	05	Presentation to be made on topics and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Cloud Computing	Course Code:	BCA0504T	Type:		Theory
Credits	04			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks			End Term Exam:	70 Marks

◯ Core	◯ Major	◉ Minor	◯ Elective	◯ Co-curricular	◯ Vocational

Course Objectives	1. To become familiar with Cloud Computing and its ecosystem. 2. To appreciate the evolution of cloud from the existing technologies 3. To learn basics of virtualization and its importance. 4. To understand security issues in cloud computing.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.
CO2	Get insight into various cloud enabling technologies like virtualized environments.
CO3	Identify the architecture, infrastructure, and delivery models of cloud computing.
CO4	Understand Security Mechanisms and issues in various Cloud Applications.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	**Overview of Computing Paradigm:** Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Introduction to Cloud Computing, The Evolution of Cloud Computing, Essential Characteristics of Cloud, Elasticity in Cloud, On Demand Provisioning, Benefits, and limitations of Cloud Computing	15	CO1
Unit 2	**Cloud-Enabling Technology:** Characteristics of Virtualized Environments. Taxonomy of Virtualization Techniques. Virtualization and Cloud Computing. Pros and Cons of Virtualization. Virtualization using KVM, Creating virtual machines, management tool for virtualization environment. Open challenges of Cloud Computing	15	CO2
Unit 3	**Cloud Architecture, Services and Storage:** Cloud Computing Architecture, NIST Cloud Computing Reference Architecture, Cloud Service Models (Xaas), Infrastructure as a Service (IaaS), Platform as a service (PaaS), Software as a Service (SaaS), Cloud Deployment Models, Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Architectural Design Challenges, Cloud Storage, Storage-as-a-Service, Advantages of Cloud Storage, Cloud Storage Providers	15	CO3
Unit 4	**Cloud Security and Issues:** Introduction, Global Risk and Compliance aspects in cloud environments and key security terminologies, Technologies for Data security, Data security risk, Digital identity, and access management (IAM), Security-As-A-Cloud Service. Cloud Issues: Stability, Partner Quality, Longevity, Business Continuity, Service-Level Agreements (SLAs), Agreeing on the Service of Clouds, Solving Problems, Quality of Service, Regulatory Issues and Accountability.	15	CO4

CO-PO and PSO Mapping	

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	2	3	1	3		1	1	2	1
CO2	2	1	1	2	1	2	1	2	2	2	1	2
CO3	2	2	2		2		2	1	2	2	3	2
CO4	1	1	3	3		3		3	2	1	3	3

Strong contribution-3,   Average contribution-2 ,   Low contribution-1,

Suggested Readings:

Text- Books	1. Cloud Computing: Concepts, Technology and Architecture by Thomas Erl and Ricardo Puttini. 2. Cloud Computing For Dummies by Judith Hurwitz.
Reference Books	1. Cloud Computing: From Beginning to End by Mr Ray J Rafaels. 2. Cloud Computing by Sandeep Bhowmik
e-Learning	• https://www.guru99.com/cloud-computing-for-beginners.html • https://onlinecourses.nptel.ac.in/noc21_cs14/preview

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **05** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **01 Marks.** **Section B:** Contains **02** descriptive questions and each question carries 2 marks. **Section C:** Contains **04** descriptive questions out of which **03** questions are to be attempted. Each question carries **05 Marks.** *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Quiz Test	04	Contains **04 descriptive questions.** Each question carries **01** Mark.
Assignment	05	Assignment to be made on topics and instruction given by subject teacher
Presentation	05	Presentation to be made on topics and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	Internet of Things(IoT)	Course Code:	BCAE0501T	Type:		Theory
Credits	04			Total Sessions Hours:		60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks		End Term Exam:		70 Marks
	○ Major	○ Minor	◉ Elective	○ Co-curricular		○ Vocational

(first row) ○ Core

Course Objectives	1. To become familiar with Internet of Things. 2. To know to basics of IoT standards. 3. To learn applications of IoT. 4. To study various challenges and security related issues of IoT.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Explain the definition and usage of the term "Internet of Things" in different contexts.
CO2	Understand the key components that make up an IoT system.
CO3	Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.
CO4	Describe the use of IoT in Indian scenario and challenges in IOT implementation.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	**Introduction to IoT:** Defining IoT, Characteristics of IoT, Evolution of IoT, Technologies that led to evolution of IoT, Physical design of IoT, Logical design of IoT, functional blocks of IoT.	12	CO1
Unit 2	**IoT Standards:** Requirement of international standard (case study), IOT standards in practice, Operating platforms/systems, Components of IOT System: Design of IOT systems, Development of prototypes. Relevance of IOT for the future: IOT in everyday life, Internet of Everything, IOT and Individual Privacy.	18	CO2
Unit 3	**Application of IoT**: Smart City Using IoT, Smart Agriculture Using IoT, Smart Factory Using IoT, Smart Vehicle Transportation Using IoT, IoT Architecture: Cloud Services, Analytics Services, Application Services IOT and SCADA, IOT and M2M, IOT and Big Data	15	CO3
Unit 4	**IoT in Indian Scenario:** IOT and Aadhaar, IOT for health services, IoT for financial inclusion, IoT for rural empowerment. **Challenges in IOT implementation**: Big Data Management, Connectivity challenges, Mission critical applications. IoT Security: Cyber Attacks, Compromising Sensitive Data, Weaponizing data, Threatening the safety of individuals, IOT for smart cities (Case study Smart city Barcelona)	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	2	3	2	2	1	1	1		
CO2	2	1		1		1	1	2	2	2		

CO3	1	2	1	2	2	2	2	2	2	2		
CO4		2	3	3	1	3	2	1	2	1		

Strong contribution-3,   Average contribution-2 , Low contribution-1,

Suggested Readings:	
Text- Books	1. Internet of Everything: Algorithms, Methodologies, Technologies and Perspectives (Internet of Things) by Beniamino Di Martino and Kuan-Ching Li. 2. Embedded Software Development for the Internet Of Things: The Basics, the Technologies and Best Practices by Klaus Elk.
Reference Books	1. Event-Driven Sensor Processor for Low-Energy Iot Embedded System by Park Daejin
e-Learning	• https://www.javatpoint.com/iot-internet-of-things • https://onlinecourses.nptel.ac.in/noc19_cs65/preview

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **05** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **01 Marks.** **Section B:** Contains **02** descriptive questions and each question carries 2 marks. **Section C:** Contains **04** descriptive questions out of which **03** questions are to be attempted. Each question carries **05 Marks.** *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Quiz Test	04	Contains **04 descriptive questions.** Each question carries **01** Mark.
Assignment	05	Assignment to be made on topics and instruction given by subject teacher
Presentation	05	Presentation to be made on topics and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: **Signature:**	**Approved by:** **Signature:**

Name of the Program	Bachelor of Computer Application (BCA)		Year/ Semester:		3rd / 5th
Course Name	Information Security & Cyber Law	Course Code:	BCAE0502T	Type:	Theory
Credits	04			Total Sessions Hours:	60 Hours
Evaluation Spread	Internal Continuous Assessment:	30 Marks		End Term Exam:	70 Marks
	○ Major	○ Minor	◉ Elective	○ Co-curricular	○ Vocational
○ Core					

Course Objectives	1. To understand various types of cyber-attacks and cyber-crimes. 2. To learn threats and risks within context of the cyber security. 3. To have an overview of the cyber laws & concepts of information security. 4. To study the defensive techniques against these attacks.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them Self and ultimately the entire Internet community from such attacks.
CO2	Interpret and forensically investigate security incidents.
CO3	Apply policies and procedures to manage Privacy issues.
CO4	Design and develop secure software modules.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Attendance: 04 Marks Quiz Test: 04 Marks Assignment: 05 Marks Presentation: 05 Marks

Session Details	Topic	Hours	Mapped CO
Unit 1	**Introduction:** Information System, types of Information Systems, development of Information Systems, concept of Information Security, need for Information Security, Threats to Information Systems, Information Assurance, basic concept of Cyber Security, Cyber Terrorism, Security Risk Analysis, principles of CIA triad, motive of Attackers, Active Attacks, Passive Attacks, Software Attacks, Hardware Attacks.	12	CO1
Unit 2	**Application Security** (Database, E-mail, and Internet), Security Technology-Firewall and VPNs, Intrusion Detection, Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards, Digital Signature	18	CO2
Unit 3	**Introduction to Cryptography**, Plain Test, Cipher Test, Encryption and decryption, Techniques used for Cryptography, Substitution Techniques, Transposition Techniques, Features of Cryptography, types of cryptography, Symmetric Key cryptography, Asymmetric Key cryptography, RSA Algorithm, types of Algorithms.	15	CO3
Unit 4	**Security Policies**, WWW policies, Email Security policies, Policy Review Process, Corporate policies, Publishing and Notification Requirement of the Policies, Information Security Standards-ISO, IT Act, Copyright Act, Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, and Patent Law.	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	2			3		1	2	2	1
CO2	1	2	3		2	1	1	2		2	1	2
CO3	2	1	1	1			2	1	1	3	2	2
CO4	2	2	2	3	2	2			1	2	3	3

Strong contribution-3,   Average contribution-2 ,   Low contribution-1,

Suggested Readings:

Text- Books	1. Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analyzing Computer Security", Pearson Education India. 2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
Reference Books	1. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla," Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
e-Learning	• https://www.w3schools.com/cybersecurity/ • https://onlinecourses.swayam2.ac.in/cec20_cs15/preview

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	**Section A:** Contains **05** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **01 Marks.** **Section B:** Contains **02** descriptive questions and each question carries 2 marks. **Section C:** Contains **04** descriptive questions out of which **03** questions are to be attempted. Each question carries **05 Marks**. *50% of the marks obtained in the mid semester examination will be added to the internal assessment.*
Quiz Test	04	Contains **04 descriptive questions.** Each question carries **01** Mark.
Assignment	05	Assignment to be made on topics and instruction given by subject teacher
Presentation	05	Presentation to be made on topics and instruction given by subject teacher
Attendance	04	As per policy
Total Marks	**30**	

Course created by: Signature:	Approved by: Signature:

Name of the Program	Bachelor of Computer Application (BCA)			Year/ Semester:		3rd / 5th
Course Name	MINI PROJECT	Course Code:	BCAP0501	Type:		Practical
Credits	03			Total Sessions Hours:		-
Evaluation Spread	Internal Continuous Assessment:	200		End Term Exam:		-

○ Core   ○ Major   ◉ Minor   ○ Elective   ○ Co-curricular   ○ Vocational

Course Objectives	1. To strengthen the understanding of your fundamentals through effective application of theoretical concepts.
	2. To plan for various activities of the project and distribute the work amongst team members.
	3. To develop student's abilities to transmit technical information clearly and test the same.
	4. To understand the importance of document design by compiling Technical Report on the Mini Project work carried out.

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	Attributes
CO1	Understand how to identify the issues and challenges of industry.
CO2	Understand, plan and execute a Mini Project with team.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical presentation based on the Mini Project work carried out.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mini Project Synopsis/ Proposal Evaluation: 25 Marks Mid-Term Project Evaluation: 25 Marks End Semester Project Evaluation: 100 Marks Project Report Evaluation: 25 Marks Evaluation by Mini Project Guide: 25 Marks

Session Details	Topic	Hours	Mapped CO
Phase-I	To understand and identify the real world problems, able to collect and prepare requirement document.	11	CO1
Phase-II	To enable students to create very precise plan and solution for the identified problem.	12	CO2
Phase-III	To implement the project by using appropriate tools and techniques and prepare a technical mini project report.	11	CO3
Phase-IV	To improve the team building, communication and management skills of the students.	11	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2			3			2	2	2
CO2	2	1	1		2	1	1	2	1	1	3	3
CO3	2	3	3	1			2	1		2	2	2
CO4	3	3	3	3	2	2			1	1	3	2

Strong contribution-3,	*Average contribution-2 , Low contribution-1,*

Suggested Readings:	
Text- Books	1. A Mini Project for MCA/BCA Students : Complete Practical Example by Manjay Ray. 2. Mark O'Ncile, "Web Services – Security", TMH.
Reference Books	1. Ivan Bayross, "HTML, DHTML, JavaScript, Perl CGI", BPB Publication.
e-Learning	• https://www.studocu.com/in/document/pondicherry-university/web-technology-lab/mini-project-bca/40339195 • https://nptel.ac.in/courses/110104073

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Project Synopsis/ Proposal Evaluation	25	• **Identification of Problem Domain and Detailed Analysis**: 08 Marks • **Study of the Existing Systems and Feasibility of Project Proposal**: 08 Marks • **Objectives and Methodology of the Proposed Work**: 09 Marks
Mid-term Project Evaluation	25	• **Design Methodology:** 05 Marks • **Planning of Project Work and Team Structure:** 05 Marks • **Demonstration and Presentation:** 15 Marks
End Semester Internal Project Evaluation	100	• **Incorporation of Suggestions:** 20 Marks • **Project Demonstration:** 30 Marks • **Presentation:** 50 Marks
Project Report Evaluation	25	• **Project Report** 07 Marks • **Description of Concepts and Technical Details** 08 Marks • **Conclusion and Discussion** 10 Marks
Evaluation by Mini Project Guide	25	• **Working within a Team:** 05 Marks • **Technical Knowledge and Awareness related to the Project:** 15 Marks • **Regularity:** 05 Marks
Total Marks	200	

Course created by: Signature:	Approved by: Signature: