



CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF INFORMATION TECHNOLOGY

INSTITUTE VISION AND MISSION:

Vision: To be a Centre of Excellence in Technical Education and Research

Mission: To address the emerging needs through quality technical education and advanced research

DEPARTMENT VISION AND MISSION:

Vision

To be a center of excellence in the field of Information Technology that yields pioneers and research experts who can contribute for the socio-economic development of the nation.

Mission:

- To impart state-of-the-art value based education in the field of Information Technology.
- To collaborate with industries and research organizations and excel in the emerging areas of research.
- To imbibe social responsibility in students.
- To motivate students to be trend setters and technopreneurs.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

Graduates of IT will be able to:

1. Analyze and provide solutions for real world problems using state-of-the-art engineering, mathematics, computing knowledge and emerging technologies.
2. Exhibit professional leadership qualities and excel in interdisciplinary domains.
3. Demonstrate human values, professional ethics, skills and zeal for lifelong learning
4. Contribute to the research community and develop solutions to meet the needs of public and private sectors.
/Work in emerging areas of research and develop solutions to meet the needs of public and private sectors.

PROGRAM OUTCOMES (PO'S)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems
2. **Problem analysis:** Identify, formulate, review, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOS):

After successful completion of the program, students will be able to:

1. Contribute to the growth of the nation by providing IT enabled solutions.
2. Develop professional skills in the thrust areas like Computer Networks, Image Processing, Data Mining, Internet of Things, Cloud Computing and Information Security.
3. Pursue higher studies in specializations like Artificial Intelligence, Data Science, Cyber Security and Software Engineering in reputed Universities.

ABOUT THE DEPARTMENT:

Information Technology is the most flourishing and extremely pervasive discipline that is witnessing an unprecedented Innovation in Technologies for Communication, Computation, and Interactivity. The Information Technology Department in CBIT started its journey in the year 2001 with an intake of 60 students. We now have strong Undergraduate Programs with an annual intake of **240 students**. The Department is presently offering **two UG programs**, one in **Information Technology** and the other in **Artificial Intelligence & Data Science**. At the **Postgraduate** level, the Department is offering specialization in **Artificial Intelligence & Data Science**.

The Department of Information Technology is committed to excellence in Teaching, Research and provides the right echo system for nurturing the budding professional skills of students. The Department has state-of-the-art Laboratories and provides enhanced Learning Facilities for students, to engage in Continuous Learning and Research. The students are imparted with Industry Relevant skills, which help them to get placed in world-class Organisations and for further excellence throughout their Professional careers.

ABOUT THE PROGRAM B.E. (IT):

B.E. Information Technology course is a specialized sub-domain of computers science which focuses on the real time applications. It is aimed at transforming engineering aspirants into qualified professionals who are capable of meeting the demands of the industry both technically and academically. The academic curriculum is designed in such a way that students will be able to become Technopreneurs.

This program covers engineering subjects and technologies like Computer Networks, Web-Based Applications, Artificial Intelligence, Embedded Systems, Security, Data Analytics etc.

IT industry is seen as one of the carriers of the economy. In this regard students of IT Program are placed well in reputed Organisations such as Microsoft, Oracle, JP Morgan and many more with good CTC.

Students who wish to continue studies after completion of their B.E. in IT degree can pursue M.Tech. Degree in Information Technology, Ms. Program in Foreign Universities, and can do any Certification courses.

Open Electives offered by IT Department

S. No.	Course Code	Course Name
1	20ITO01	Object Oriented Programming Using JAVA
2	20ITO02	Principles of Internet of Things
3	20ITO03	Introduction To Cloud Computing

20IT001

OBJECT ORIENTED PROGRAMMING USING JAVA

(Open Elective)

Instruction	3 L Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives:

1. To familiarize with fundamentals of object-oriented programming paradigm.
2. To impart the knowledge of string handling, interfaces, packages and inner classes.
3. To acquaint with Exception handling mechanisms and Multithreading.
4. To gain knowledge on collection framework, stream classes.
5. To familiarize web application environment using Servlets and JSP

Course Outcomes:

Upon completing this course, students will be able to:

1. To understand fundamentals of object-oriented programming paradigm.
2. To apply knowledge of string handling, interfaces, packages and inner classes.
3. To implement Exception handling mechanisms and Multithreading.
4. To demonstrate knowledge on collection framework, stream classes.
5. To develop web applications using Servlets and JSP.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	-	-	-	-	-	-	1	-	-
CO2	-	2	1	1	-	-	-	-	-	-	-	-
CO3	-	1	1	1	-	-	-	-	-	-	3	-
CO4	1	2	1	1	-	-	-	-	-	-	3	1
CO5	1	2	1	2	3	-	-	1	3	-	3	1

UNIT-I

OOP concepts: Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object oriented programming paradigms.

Introduction to Java: Java’s Magic: The Byte code, The Java Buzzwords, Simple Java Programs, Java Primitive Types, Arrays: How to create and define arrays, Basic Operators, Control statements.

Introducing Classes: Declaring objects, methods, Constructors, this keyword, Method Overloading and Constructor Overloading, Objects as parameters, Returning objects, Use of static and final keywords.

UNIT-II

Inheritance: super and subclasses, Member access rules ,super keyword, Method overriding, Dynamic method dispatch , Abstract classes, using final with inheritance , Introduction to Object class.

Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

Interfaces: Defining and implementing interfaces, Nested Interfaces. **Strings Handling:** String & StringBuffer classes, StringTokenizer class and Wrapper classes and conversion between Objects and primitives.

Inner classes in Java: Types of inner classes, Creating static / non-static inner classes, Local and anonymous inner classes.

UNIT-III

Exception Handling in Java: what are Exceptions? Exception types, Usage of try, catch, throw, throws and finally clauses, writing your own exception classes. **Multi-threading in Java:** The java Thread Model, How to create threads, Thread class in java, Thread priorities, Thread synchronization.

Generics: What are Generics? Generic classes, bounded types, Generic methods and interfaces.

UNIT-IV

Collections Framework: Overview of Collection Framework, Commonly used Collection classes – Array List, Linked List, Hash Set, LinkedHashSet, Tree Set, Collection Interfaces –Collection, List, Set, Sorted Set, Accessing a collection via an Iteration, Storing user-defined classes in collections, Map Interfaces and Classes, Using a comparator. Legacy classes – Vector, Hash table, The Enumeration interface.

Input/Output : How to read user input (from keyboard) using scanner class, Stream classes, InputStream, OutputStream, FileInputStream, FileOutputStream, Reader and Writer, FileReader, FileWriter classes. File class.

UNIT-V

Java Servlets: Overview of Java Servlet API, Servlet Implementation, Servlet Configuration, Servlet Exceptions, Servlet Life cycle, Request and Response methods, Approaches to Session tracking, Servlet Context, Servlet Collaboration.

JSP Basics: Introduction to JSP, Directives, Scripting Elements, Standard Actions.

Databases: Connect servlet to MySQL, Connect JSP to MySQL.

Text Books:

1. Herbert Schildt, “Java: The Complete Reference”, 8th Edition, Tata McGraw Hill Publications, 2011.
2. Kathy Sierra, Bryan Basham, Bert Bates, —Head First Servlets and JSP, 2nd Edition, O’Reilly Media, Inc, 2008.

Suggested Reading:

1. E Balagurusamy “Programming with JAVA”, 6th Edition, Tata McGraw-Hill Publishing company Ltd, 2019.
2. Sachin Malhotra & Saurabh Choudhary, “Programming in Java”, 2nd Edition, Oxford University Press, 2014.
3. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, 4th Edition, Tata McGraw-Hill Publishing company Ltd., 2010. 4. Kathy Sierra, Bert Bates, “Head First Java: A Brain-Friendly Guide” 2nd Edition, O’Reilly, 2005

Web Resources:

1. https://www.cse.iitb.ac.in/~nlp-ai/javalect_august2004.html.
2. <http://nptel.ac.in/courses/106106147/>
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-092-introduction-to-programming-in-java-january-iap-2010/lecture-notes/>

20ITO02

PRINCIPLES OF INTERNET OF THINGS

(Open Elective)

Instruction	3 L Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives:

1. To provide an overview of Internet of Things, building blocks of IoT and real-world applications.
2. To explore various IOT enabling technologies.
3. To facilitate students, understand Python scripts for IoT platform.
4. To identify steps in IOT design Methodology.
5. To introduce about the Raspberry Pi device, its interfaces and Django Framework.

Course Outcomes:

Upon completing this course, students will be able to:

1. Comprehend the terminology, protocols and communication models of IoT.
2. Define the various IoT enabling technologies and differentiate between M2M and IoT.
3. Acquire the basics of Python Scripting Language used in developing IoT applications.
4. Describe the steps involved in IoT system design methodology.
5. Design simple IoT systems using Raspberry Pi board and interfacing sensors with Raspberry Pi.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	1	-	1	-	-	-	-	1
CO2	1	2	2	1	-	2	1	-	-	1	-	-
CO3	2	2	2	2	1	2	2	1	1	1	1	1
CO4	2	1	2	2	1	-	2	1	-	1	2	2
CO5	1	2	2	1	-	2	1	-	1	1	-	-

UNIT-I

Introduction & Concepts: Introduction to Internet of Things- Definitions & Characteristics of IoT, Physical Design of IOT-Physical Layer, Network Layer, Transport Layer, Application Layer, Things in IoT, IoT Protocols, Logical Design of IOT-Nonfunctional Blocks, IoT Communication Models-Requestresponse, Publisher-Subscriber, Push-Pull, Exclusive Pair, IoT Communication APIs-REST API, Websocket API.

UNIT-II

IOT Enabling Technologies: Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IOT Levels & Deployment Templates. Differences and similarities between IOT and M2M, Domain Specific IoT's – IoT applications for Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT-III

Introduction to Python: Motivation for using Python for designing IoT systems, Language features of Python, Data types- Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions, Data Structures: Control of flowif, for, while, range, break/continue, pass, functions, modules, packaging, file handling, data/time operations, classes, Exception handling.

UNIT-IV

IoT Platforms Design Methodology: Introduction, IoT Design Methodology Steps-Purpose and Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device and Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

UNIT-V

IoT Physical Devices and End Points: Basic building blocks of an IoT device, Raspberry Pi about the Raspberry Pi board, Raspberry Pi interfaces-Serial, SPI, I2C, Other IoT Devices pcDuino, BeagleBone Black, Cubieboard. Python Web Application Framework: Django Framework-Roles of Model, Template and View

Text Books:

1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things - A Hands-on Approach", Universities Press, 2015.
2. Matt Richardson & Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 2014.

Suggested Reading:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
2. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", Wiley Publications.

Web Resources:

1. The Internet of Things - Article <https://dl.acm.org/citation.cfm?id=1862541>
2. Internet of Things - Tutorial
3. http://archive.eurescom.eu/~pub/abouteurescoiem/message_2009_02/Eurescom_message_02_2009.pdf

20ITO03

INTRODUCTION TO CLOUD COMPUTING

(Open Elective)

Instruction

3 L Hours per week

Duration of SEE

3 Hours

SEE

60 Marks

CIE

40 Marks

Credits

3

Course Objectives:

1. To impart the basics of cloud computing for business management.
2. To illustrate and explore the benefits of cloud storage and its applications, usage by managers.
3. To enable students explore cloud computing driven real time systems.

Course Outcomes:

Upon completing this course, students will be able to:

1. Understand the characteristics and models in Cloud computing.
2. Asses Cloud services applications and the challenges associated with Cloud Computing.
3. Apply various cloud services and deployment models and virtualization techniques for business.
4. Analyze the concepts of cloud storage and demonstrate their use.
5. Evaluate various cloud programming models and apply them in virtual office management.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	1	-	-	-	1	1	1	1
CO2	2	1	2	1	2	-	-	-	-	-	1	-
CO3	2	1	2	2	1	-	-	-	-	-	-	-
CO4	2	1	1	1	1	-	-	-	-	-	-	1
CO5	2	1	1	1	1	-	-	-	-	-	-	1

UNIT-I

Cloud Computing Overview: Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling , Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

UNIT-II

Cloud Insights: Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

UNIT-III

Cloud Architecture- Layers and Models: Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.

Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

UNIT-IV

Cloud Simulators- CloudSim and GreenCloud : Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud

UNIT-V

Introduction to VMWare Simulator: Basics of VMWare, advantages of VMware virtualization, using VMware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

Text Book:

1. Anthony T.Velte , Toby J. Velte Robert Elsenpeter, “Cloud computing a practical approach”, TATA McGraw- Hill , New Delhi – 2010

Suggested Reading:

1. Michael Miller – Que, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Onlin”, 2008
2. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, “Cloud computing for dummies”, Wiley Publishing, Inc, 2010
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, “Cloud Computing (Principles and Paradigms)”, Inc. 2011

Web Resource:

1. <https://nptel.ac.in/courses/106105167/1>