

Year:III**Semester: I**

Course Code	Course Title	Credits	Lecture (Hrs.)	Tutorial (Hrs.)	Laboratory (Hrs.)	Total (Hrs.)
BIT301HS	Research Methodology	3	3	1		4
BIT302CO	Computer Graphics	3	3	1	2	6
BIT303CO	Cryptography and Network Security	3	3	1	2	6
BIT304CO	Web Technology	3	3	1	2	6
BIT305CO	Internet of Things	3	3	1	2	6
BIT306CO	Project-V	2	-	-	3	3
	Total	17	15	5	7	31

**Research Methodology
BIT351HS**

Year III

Semester II

Teaching Schedule Hours/week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	-	Theory	Practical	Theory	Practical	100
			20		80		

Course objectives:

This course will help you accomplish the following things:

- ability for individual research work on the field of information and communication technologies,
- ability to research, select and organize information, as well as synthesize solution and anticipate their consequences,
- mastering of research methods, procedures and processes, development of critical and self-critical assessment,
- ability to use knowledge in practice

Course Contents:

Unit 1: Introduction to Research - [8Hrs]

Meaning of Research, Applied and Fundamental Research, Scientific Research Process, Management Research Methods: Action Research, Evaluation Research, Managerial Research. Meaning of Project Work, Objectives of Project Work, Methods of Field and Project Work: Exploratory/Descriptive, Case Study, Feasible Study.

Unit 2: Research Design – [8 Hrs]

Concept of Research Design, Elements of Research Design, Types of Research Design: Historical, Descriptive, Developmental, Case Study, Co-relational, Causal- Comparative and Action Research Design.

Unit 3: Sampling Process and Data Collection - [8 Hrs]

Sampling and its significance in Research, Types of Sampling, Probability and Non- Probability Sampling: Stratified, Systematic, Multistage, Judgment, Quota, and Convenience sampling, Sampling Error and Non-Sampling Error, Primary and Secondary Data, Use of Secondary Data, Methods of Collecting Primary Data: Interviewing, Questionnaire and Observation.

Unit 4: Testing of Statistical Hypothesis –

[11 Hrs]

Statistical Hypothesis, Level of Significance, Difference between Parametric and Non- Parametric tests. Use of z-Distribution in Hypothesis Testing of Population Mean and Population Proportion in one-Sample Case.

Unit 5: Writing the Research Report [10 Hrs]

Purpose of Writing a Report, Contents and Style of Report, Types of Report: Descriptive and Analytical Report, Presenting Data, Table and Figures in Report, Use of Quotations, Abbreviations, Bibliography

Reference Books:

1. Kerlinger, Fred N, **Foundations of Behavioral Research**

Computer Graphics
BIT352CO

Year III

Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective:

The main objective of this course is to provide the basic techniques used in computer graphics system.

Course Contents:

Unit 1: Introduction

[2 Hrs]

- 1.1 History of computer graphics
- 1.2 Application of computer graphics

Unit 2: Graphics hardware [5Hrs]

- 2.1 Keyboard, mouse (mechanical & optical), lightpen, touchscreen, tablet input hardware, joystick
- 2.2 Raster and vector display architecture
- 2.3 Architecture of graphical display terminals including frame buffer and color manipulation techniques RGB, CMYK

Unit 3: Two dimensional algorithms [8Hrs]

- 3.1 Direct and incremental line drawing algorithms
- 3.2 Bresenham's line drawing algorithms for positive and negative slopes (DDA algorithm)
- 3.3 Mid-point circle drawing and mid-point ellipse-drawing algorithms

Unit 4: Two-dimensional transformations [10Hrs]

- 4.1 Introduction to transformation
- 4.2 Two-dimensional translation, scaling and rotation
- 4.3 Successive and composite transformations

- 4.4 Pivot-point rotation and fixed-point scaling
- 4.5 Reflection and shearing
- 4.6 Viewing transformation and windows-to-viewport transformation
- 4.7 Clipping (The Cohen-Sutherland line-clipping algorithm, The Sutherland-Hodgman polygon clipping algorithm)

Unit 5: Three-dimensional graphics [12Hrs]

- 5.1 Projection (parallel and perspective)
- 5.2 3D transformations
 - 5.2.1 Translation, scaling, reflection
 - 5.2.2 Rotation (about an axis, line parallel to coordinate axis, and line not parallel to coordinate axis)
 - 5.2.3 Windows to viewpoint transformation
- 5.3 Hidden line and Hidden surface removal techniques (back face detection, Z-buffer, A-buffer, scan-line)
- 5.4 Introduction to non-planar surfaces (Bezier, Splines)

Unit 6: Light, color and shading [5Hrs]

- 6.1 Introduction
- 6.2 Need for shading in engineering data visualization
- 6.3 Algorithms to stimulate ambient, diffuse and specular reflections
- 6.4 Constants, Gouraud and Phong shading models

Unit 7: Graphic languages [2Hrs]

- 7.1 Need for machine independent graphic languages (PHIGS, GKS)
- 7.2 Discussion of available languages and file formats (graphical file format)

Unit 8: Introduction to animation [1Hr]

- 8.1 Introduction to OpenGL
- 8.2 Application & today's trends

Laboratory work:

1. Introduction to graphics primitive and graphics drivers
2. Implementation of line drawing algorithms
 - 2.1 DDA
 - 2.2 Bresenham's algorithm
 - 2.3 Bresenham's general algorithm

3. Implementation of mid-point circle algorithm
4. Implementation of mid-point ellipse algorithm
5. Implementation of basic 2D and 3D transformation
6. Implementation of windows-to-viewport transformation
7. Implementation of line-clipping process

Reference books:

1. D. Hearn & M. P. Baker, "Computer Graphics", PHI Edition
2. T. I. James, D. Foley, A. Van Dam, S. K. Feiner & J. F. Hughes, "Computer Graphics, Principles and Practice", PHI Edition

Cryptography and Network Security

BIT303CO

YearIII

Semester:I

TeachingScheduleHours/Week			ExaminationScheme				
Theory	Tutorial	Practical	InternalAssessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective:

To provide a practical survey of the principles and practice of network security.

Course Contents:

Unit 1:Introduction

[3 Hrs]

What is network Security and its working? Types of Network Security, Differences among Network security, Cyber security and Information Security

Unit 2: Basics of Computer Network

[5 Hrs]

Network Devices (Hub, Repeater, Bridge, Switch, Router, Gateways and Brouter), Network Terminology:IP Address (Internet Protocol address),MAC Address (Media Access Control address),Port,Socket,DNS Server, ARP,RARP, Layers of OSI and TCP/IP model.

Unit 3: IP Security

[3 Hrs]

Uses of IP Security, Components of IP Security, Working of IP Security,IPSec Architecture, Difference between IPSec and SSL

Unit 4:Transport-Level Security

[7 Hrs]

Benefits of TLS, Working of TLS, Secure Electronic Transaction (SET) Protocol Difference between Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Socket Layer (SSL).

Unit 5:Intrusion Detection &Prevention System (IDS/IPS)

[6 Hrs]

Classification of Intrusion Detection System, Detection Method of IDS, Classification of Intrusion Prevention System (IPS), Detection Method of Intrusion Prevention System (IPS), Comparison of IPS with IDS, Approaches to Intrusion Detection and Prevention.

Unit 6: Wireless Network Security

[7 Hrs]

6.1 IEEE 802.11 Wireless LAN Overview

- 6.2 IEEE 802.11i Wireless LAN Security
- 6.3 Wireless Application Protocol Overview
- 6.4 Wireless Transport Layer Security
- 6.5 WAP End-to-End Security

Unit 7: Information Security

[4 Hrs]

Approaches to Information Security Implementation, Objectives of IT, Need of Information Security, Threats to Information Security, Active and Passive attacks in Information Security, Difference between Active Attack and Passive Attack

Unit 8: Cryptography

[10 Hrs]

Elementary Cryptography: Substitution Ciphers, Transpositions, Playfair Cipher with Examples, Hill Cipher, Vigenère Cipher, The Data Encryption Standard, RSA Algorithm, Uses of Encryption.

Laboratory Work:

There shall be lab classes covering important features of the course.

Reference Books:

1. Cryptography and Network Security: Principles and Practice, 5/William Stallings, ISBN-10: 0136097049, Prentice Hall, India Limited

Web Technology BIT304CO

Year:III

Semester:I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objective: After finishing this subject, students will be able to develop web pages using HTML, JavaScript, XML and advanced concepts of web applications and server-side programming.

Course Contents:

1. Introduction to Web Technology

[4 Hrs]

- 1.1 Web Basics: Web Browsers, Web Servers, Tier Technology and its types, Static and Dynamic Web Page. Client side and Server side Scripting.
- 1.2 Web Protocols: details of HTTP, HTTPs, FTP
- 1.3 Introduction to Free and Open Source Software
 - 1.3.1 Characteristics, Advantages and Disadvantages Free Software, Open Source Software and Proprietary Software
 - 1.3.2 Difference between Free Software, Open Source Software and Proprietary Software
 - 1.3.3 Licensing and its types: Commercial License and Open Source License

2. HTML, XHTML & HTML5

[8 Hrs]

- 2.1 Introduction
- 2.2 Document metadata
- 2.3 Basic structure of HTML
- 2.4 Sections
- 2.5 Grouping content
- 2.6 Text-level semantics
- 2.7 Embedded content
- 2.8 Tabular data
- 2.9 Forms
- 2.10 Interactive elements
- 2.11 List
- 2.12 Links
- 2.13 Images
- 2.14 Frames

3. Page Designing with CSS

[8 Hrs]

- 3.1 Introduction to designing approaches
 - 3.1.1 Table-based designs
 - 3.1.2 Table-less designs
- 3.2 Cascading Style Sheet and its properties
 - 3.2.1 Introduction
 - 3.2.2 CSS vs CSS3
 - 3.2.3 CSS properties — Text and Fonts, Colors and Backgrounds, The Box Model (dimensions, padding, margin and borders), Positioning and Display, Lists, Tables, Media

- 3.2.4 Converting Image design to HTML (Slicing)
- 4. Client-side Scripting** [6 Hrs]
 - 4.1 Introduction
 - 4.2 JavaScript
 - 4.2.1 Lexical Structure
 - 4.2.2 Variables, Identifiers, Data Types and Values, Scope, Literals, Reserved Words
 - 4.2.3 Expression and operators, Statements
 - 4.2.4 Arrays, Objects (Math, String, Date)
 - 4.2.5 Functions
 - 4.2.6 Regular Expressions
 - 4.2.7 Garbage Collection
 - 4.3 Objects
 - 4.3.1 Objects and properties
 - 4.3.2 Constructors
 - 4.3.3 Prototype and Inheritance
 - 4.3.4 Object as an associative array
 - 4.4 DOM and Event Handling
 - 4.5 Introduction to JSON, jQuery, jQuery Integration
 - 4.6 Saving State with Cookies
- 5 XML, AJAX, and Web Services** [5 Hrs]
 - 2.1 Introduction to XML
 - 2.2 XML validation with DTD & schema
 - 2.3 XSL and XSLT
 - 2.4 XML processing with PHP
 - 2.5 Asynchronous JavaScript and XML (AJAX)
 - 2.6 Web services
- 6. Server Side Programming with PHP** [5 Hrs]
 - 3.1 Introduction to server-side programming
 - 3.2 PHP Basics, Object oriented Concept
 - 3.3 Embedding PHP scripts
 - 3.4 Basic syntax (Variables, operators, expressions, constants)
 - 3.5 Control structures
 - 3.6 PHP functions
 - 3.7 Recursion
 - 3.8 String manipulation
 - 3.9 Using regular expression
 - 3.10 Exceptional handling with PHP
- 7. Database Connectivity in PHP** [6Hrs]
 - 5.1 Introduction to SQL
 - 5.2 Basic SQL commands (CRUD)
 - 5.3 HTML forms and Methods
 - 5.4 Database connectivity
 - 5.5 MySQL functions
 - 5.6 Executing DDL and DML queries using PHP
 - 5.7 Login and authentication
 - 5.8 Session and Cookies
- 8. Responsive Websites and Advanced Server-side Issues** [3 Hrs]
 - 7.1 Responsive website strategies and design
 - 7.2 Smart device functionality
 - 7.3 Testing and debugging
 - 7.4 Overview to advanced server-side issues
 - 7.5 MVC Frameworks (Code-Igniter)

Laboratories: There shall be lab exercises covering all features of above chapters.

Reference Books:

- 1) "Open Sources: Voices from the Open Source Revolution", Chris DiBona, Sam Ockman, Mark Stone
- 2) "Perspectives on Free & Open Source Software", Joseph Feller, Brian Fitzgerald, Scott A. Hissam& Karim R. Lakhani, MIT Press
- 3) "Open Sources: Voices from the Open Source Revolution", Chris DiBona, Sam Ockman, O'Reilly Media
- 4) "Murach's HTML5 & CSS3", Zak Ruvalcaba& Anne Boehm
- 5) "JavaScript: The Definitive Guide", 6th Edition, David Flanagan, O'Reilly Media
- 6) "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, & Web Graphics", Jennifer Niederst Robbins, O'Reilly
- 7) "HTML5 Programming with JavaScript", John Paul Mueller, Wiley
- 8) "HTML5 & CSS3 for the Real World", Estelle Weyl, Louis Lazaris, Alexis Goldstein, Sitepoint
- 9) David Hunter, "*Beginning XML*", Wrox Publication
- 10) Robin Nixon. "*Learning PHP, MySQL, & JavaScript*", O'Reilly Media
- 11) RasmusLerdorf, Kevin Tatroe, & Peter MacIntyre, "*Programming PHP*", O'Reilly Media
- 12) Deitel, Deitel, Goldberg, "*Internet & World Wide Web How to Program*", Pearson Education
- 13) Paul S. Wang, "*Dynamic Web Programming & HTML 5*", Chapman & Hall/CRC
- 14) Rahul Banerjee, "*Internetworking Technologies*", PHI Ltd.
- 15) Charles Ashbacher, "*SAMS Teach Yourself XML in 24 Hours*", Techmedia

**Internet of Things
BIT305CO**

YearIII

Semester:I

TeachingScheduleHours/Week			ExaminationScheme				
Theory	Tutorial	Practical	InternalAssessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	150
			20	50	80	-	

Course Objectives:

The objectives of this course are to provide theoretical as well as practical knowledge of fundamentals of Internet of Things to make students capable of designing, implementing and managing the issues of IoT in their personal as well professional life.

Course Contents:

Unit 1: Introduction to IoT

[6 Hrs]

- Introduction to Internet of Things
- History of IoT
- IoT Architecture
- IoT Frameworks
- Benefits of IOT
- Applications of IOT

Unit 2: FundamentalIoTMechanisms and Key Technologies

[8 Hrs]

- Identification of IoT Objects and Services,
- Structural Aspects of the IoT,
- Environment Characteristics,
- Traffic Characteristics,
- Scalability,
- Interoperability,
- Security and Privacy,
- Open Architecture,
- Key IoT Technologies,
- Device Intelligence,
- Communication Capabilities,

- Mobility Support,
- Device Power,
- Sensor Technology,
- RFID Technology,
- Satellite Technology

Unit 3: IoT Protocols

[6 Hrs]

- Protocol Standardization for IoT
- Efforts
- M2M and WSN Protocols
- SCADA and RFID Protocols
- Unified Data Standards – Protocols
- IEEE 802.15.4
- BACNet Protocol
- Modbus
- Zigbee Architecture
- Network layer
- 6LowPAN
- CoAP
- Security

Unit 4: IoTwithRaspberry PI

[9 Hrs]

- Building IOT with RASPERRY PI
- IoT Systems
- Logical Design using Python
- IoT Physical Devices & Endpoints
- IoT Device
- Building blocks
- Raspberry Pi -Board
- Linux on Raspberry Pi
- Raspberry Pi Interfaces
- Programming Raspberry Pi with Python

Unit 5: Internet of Things, Privacy, SecurityandGovernance

[6 Hrs]

- Vulnerabilities of IoT
- Security requirements
- Threat analysis
- Use cases and misuse cases
- IoT security tomography and layered attacker model
- Identity establishment
- Access control
- Message integrity

- Non-repudiation and availability
- Security model for IoT.

Unit 6:Real World Application and Case Studies

[10 Hrs]

- Real world design constraints and challenges
- Applications and Asset management,
- Industrial automation
- Smart Metering Advanced Metering Infrastructure
- Smart grid
- e-Health Body Area Networks
- Commercial building automation
- Smart cities - participatory sensing
- Data Analytics for IoT
- Software & Management Tools for IoT
- Cloud Storage Models & Communication
- APIs
- Cloud for IoT
- Amazon Web Services for IoT

Practical Works

The practical work consists of all features of IoT .

Reference Books:

1. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications
2. ArshdeepBahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011. 3.
4. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.
5. Jan Ho“ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
6. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012
7. HakimaChaouchi, “ The Internet of Things Connecting Objects to the Web” ISBN : 978-1-84821-140-7, Willy Publications
8. Daniel Kellmerit, Daniel Obodovski, “The Silent Intelligence: The Internet of Things”,. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 0989973700, ISBN-13: 978- 0989973700. 4. Fang Zhaho, Leonidas Guibas, “Wireless Sensor Network: An information processing approach”, Elsevier, ISBN: 978-81-8147-642-5.

Project-V
BIT306CO

Year: III

Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
-	-	3	-	60	-	40	100

Course Objective:

After finishing this project, students will be able to develop web-based application using server-side scripting.

Course Contents:

A total of 45 lab hours covering all the features of server-side scripting will be assigned to every student. Every group of students (upto 3) will be assigned a project work. Students must develop the assigned application, submit written report, and give oral presentation.

Project Evaluation Criteria:

The practical marks allotted for the project should be evaluated based on the following criteria:

- Title Presentation — 10 Marks
- Mid-term Presentation — 15 Marks
- Pre-final Submission and Presentation — 35 Marks