FIFTH SEMESTER (INFORMATION TECHNOLOGY)

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
-	Industrial Training	-	-	-	2	-	-	-	-	-	50	3	50	50
5.1	Software Engineering	4	-	2	4	20	30	50	50	2 ½	50	3	100	150
5.2	Web Development using PHP	4	-	6	6	20	30	50	50	2 ½	50	3	100	150
5.3	Computer Programming using Python	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
5.4	Information Security & IT Laws	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
5.5	Internet of Things	4	-	4	5	20	30	50	50	2 ½	50	3	100	150
5.6	Minor Project Work	-	-	6	3	-	60	60	-	-	60	-	60	120
	#Student Centred Activities	-	-	2	1	-	30	30	-	-	-	-	-	30
Total		20	-	28	31	100	240	340	250	-	360	-	610	950

\# Student Centred Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc

5.1 SOFTWARE ENGINEERING

L T P

4 - 2

RATIONALE

The system analysis and design is the backbone of Application software development. After studying the subject the students will be able to develop and design the system according to given requirements. It involves various steps in analysis and design of the system. It includes the knowledge of preparing project systematically. It is important to know about various aspects of the system analysis and design so that the students will be able to understand the responsibilities while designing and implementing the project.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

understanding the problem and corresponding requirement for development of software.
describe the various phases of the system development life cycle.
identify the expected benefits and scope of the projects.
prepare and develop data flow diagrams and decision tables.
perform a feasibility study of the system.
write detailed design specifications for programmes and database.
select methods for evaluating the effectiveness and efficiency of a system.
apply different testing techniques on simple programme.

DETAILED CONTENTS

1. Introduction to Software Engineering   (10 periods)

System Concepts: Types of systems : (open, closed, static and dynamic systems).
Introduction, Programmes v/s Software Products
Emergence of Software Engineering- Early Computer Programming, High-level Language Programming, Control flow based Design, Data Structure Oriented Design,Object Oriented Design

2. Software Life Cycle Models   (12 periods)

Requirement of Life Cycle Model, Classic Waterfall Model, Prototyping Model, Evolutionary Model, Spiral Model, introduction to agile methodology.
Comparison of different Life Cycle Models

3. Software Planning   (10 periods)

Responsibilities of Software Project Manager
- Metrics for Project Size Estimation- LOC(Lines of Code), Function Point Metric
- Project estimation Techniques- Using COCOMO Model.

4. Requirement Analysis and Specification   (06 periods)

Requirement gathering and Analysis, Software Requirement Specifications(SRS), Characteristics of good SRS

5. Software Design and Implementation   (10 periods)

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Characteristics and features of good Software Design Cohesion and Cupling, Software design Approaches- Function Oriented Design (Data flow diagrams, Data dictionary, Decision Trees and tables), Object Oriented Design, Structured Coding Techniques, Coding Styles, and documentation

6. Software Testing   (08 periods)

Concept of Testing, Testing type cycle (V-Model), Verification v/s Validations, Unit Testing, Black Box Testing, White Box Testing, Integration testing, System testing, Configuration management, Overview of test cases.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests
Software installation, operation, development and viva-voce

LIST OF PRACTICALS

Develop a SRS on a given topic/project/problem.
Develop DFD Model (level 0 and level 1 DFD) of the problem.
Develop sequence diagram
Develop class diagrams
Use testing tools such as J-meter, Canoo Web Test
Use a project management tool such as Microsoft project or Gantt project etc (Team week, Target process, Gantt project)
Write test cases for any known application
Take any system and study its system specification and report the various bugs.

RECOMMENDED BOOKS

1. Software Engineering by Rajib Mall, PHI Publishers, New Delhi
2. An Integrated Approach to Software Engineering by Pankaj Jalote, Narosa Publishing House Pvt Ltd, Darya Ganj, New Delhi 110002
3. Software Engineering, Sangeeta Sabharwal, New Age International, Delhi
4. Software Engineering by KK Aggarwal and Yogesh Singh
5. Software Engineering – A Practitioner's Approach by RS Pressman, Tata McGraw
    Hill Publishers, New Delhi
6. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites for Reference:
        http://swayam.gov.in
        www.emetechnologies.com/UP-SE-Sheets.zip

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	18
2	12	24
3	10	18
4	06	10
5	10	18
6	08	12
Total	56	100

5.2 WEB DEVELOPMENT USING PHP

L T P
4 - 6

RATIONALE

This course will enable the students to understand and develop competency amongst the students to design professional database backed dynamic and feature based web sites. The course covers the use of programming with PHP and the concepts of database with MySQLStudents will be introduced to popular web application frameworks for building scalable web applications. The main objective for this course is to motivate student's interest in learning Web-app development by giving them an insight into its possibilities through practical applications. In addition, the course also provides a sufficiently broad but practical introduction to Server-side web technologies.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

perform various logical operations in PHP
create simple programmes to validate forms in PHP
perform database connectivity using PHP
apply the basic concepts, principles and practices of Web-site development using server-side technologies (PHP &MySQL)
install Word Press
create and manage Blogs,Websites using WordPress

DETAILED CONTENTS

PHP Introduction   (20 Periods)

Introduction to PHP: How PHP Works , The php.ini File, Basic PHP Syntax, PHP variables, statements, operators, decision making, loops, arrays, strings, PHP OOPs concept, PHP forms (form handling , validation) , get and post methods, functions.
Introduction to cookies, storage of cookies at client side, Using information of cookies. Creating single or multiple server side sessions. Timeout in sessions.

PHP and MySQL   (10 Periods)

Introduction to MySQL, connecting to MySQL, database, creation, insertion, deletion and retrieval of MySQL data using PHP.

Ajax   (08 Periods)

AJAX Introduction, XMLHttp, Request object, server response, AJAX events, Validation, Interaction with API

WordPress   (CMS)   (18 Periods)

WordPress Basics:
Introduction to content management systems based on PHP, Introduction to WordPress, How WordPress Works ,Installation of WordPress

Posts&Pages:
Introduction to Blogging, Creating Blogs, Using Images, Wrapping Text Around Images, Comments, Post Formats, Linking to Posts, Pages, and Categories, Using Smilies, Links Manager, WordPress Feeds, Using Password Protection,

Customizing Site Appearance and Themes:
Developing a Color Scheme, Designing Headers, CSS Horizontal Menus, Dynamic Menu Highlighting, Navigation Links, Next and Previous Links, Styling for Print, Designing Your Post Meta Data Section, Separating Categories in your Post Meta Data Section, Customizing the Read More, Formatting Date and Time, Finding CSS Styles, Creating

Individual Pages, Uploading Files using WordPress Themes, Templates, Template Tags, Template Hierarchy, Validating a Website, Know Your Sources, WordPress Site Maintenance

LIST OF PRACTICALS

1.   Design PHP based web pages using correct PHP, CSS, and XHTML syntax, structure.
2.   Create Web forms and pages that properly use HTTP GET and POST protocol as appropriate.
3   Design SQL language within MySQL and PHP to access and manipulate databases.
4.   Install and configure both PHP and MySQL.
5   Create PHP code that utilizes the commonly used API library functions built in to PHP.
6.   Design and create a complete web site that demonstrates good PHP/MySQL client/serverdesign using ajax
7.   To store a cookie using PHP on client side.
8.   To save the user session on server side.
9.   Design website using WordPress
10.   Creation of basic Blogging website

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of websites/WebPages to students while doing practical exercises. Since the entire course content is web based, students can practice it online. The teachers should have practice on this framework. Entire course is hands-on based so practicals should be conducted in the laboratory.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests
Actual laboratory and practical work, exercises and viva-voce
Software installation, operation, development and viva-voce

RECOMMENDED BOOKS

Head First PHP &MySQL , O'Reilly Media, Inc , Michael Morrison, Lynn Beighley
Sams Teach Yourself PHP, MySQL, and Apache All in One" by Julie C. Meloni, Publisher: SAMS ,ISBN 0-672-32976-X
Web enabled development application by Ivan Byross: Commercial; TMH
PHP: The Complete Reference , by Steven HolznerMcgraw Higher Ed
PHP and MySQL Web Development , by Luke Welling , Pearson Education india
WordPress 3.5 Complete , Packt Publishing , by karolkrol , Aaron hodge Silver
WordPress Web Application Development , Packt Publishing
Professional WordPress: Design and Development, by Brad Williams, David Damstra, and Hal Stern, Wrox Publication
Building Web Apps with WordPress: WordPress as an Application Framework , by Brian Messenlehner and Jason Coleman , O'Reilly Media
e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

Websites for Reference:

        http://swayam.gov.in
http://spoken-tutorial.org

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	20	36
2	10	18
3	08	14
4	18	32
Total	56	100

5.3   COMPUTER PROGRAMMING USING PYTHON

L T P
4 - 4

RATIONALE

This course introduces to the students the Python language. Upon completion of this course, the student will be able to write non trivial Python programs dealing with a wide variety of subject matter domains. Topics include language components, the IDLE/IDE environment, control flow constructs, strings, I/O, collections, classes, modules, and regular expressions.

LEARNING   OUTCOMES

After undergoing the course, the students will be able to:

execute Python code in a variety of environments
use correct Python syntax in Python programs
use the correct Python control flow construct
write Python programs using various collection data types
write home grown Python functions
use standard Python modules such as os, sys, math, and time
trap various errors via the Python Exception Handling model
use the IO model in Python to read and write disk files
create their own classes and use existing Python classes.
understand and use the Object Oriented paradigm in Python programs
use the Python Regular Expression capabilities for data verification

DETAILED CONTENTS

1.   Introduction   (04 Periods)

Brief History of Python
Python Versions
Installing Python
Environment Variables
Executing Python from the Command Line
IDLE
Editing Python Files
Python Documentation
Getting Help
Dynamic Types
Python Reserved Words
Naming Conventions

2.   Basic Python Syntax   (04 Periods)

Basic Syntax
Comments
String Values
String Methods
The format Method
String Operators
Numeric Data Types
Conversion Functions
Simple Output
Simple Input
The % Method
The print Function

3.   Language Components   (06 Periods)

Indenting Requirements
The if Statement
Relational and Logical Operators
Bit Wise Operators
The while Loop
break and continue
The for Loop

4.   Collections   (10 Periods)

Introduction
Lists
Tuples
Sets
Dictionaries
Sorting Dictionaries
Copying Collections
Summary

5.   Functions   (08 Periods)

Introduction
Defining Your Own Functions
Parameters
Function Documentation
Keyword and Optional Parameters
Passing Collections to a Function
Variable Number of Arguments
Scope
Functions - "First Class Citizens"
Passing Functions to a Function
map
filter
Mapping Functions in a Dictionary
Lambda
Inner Functions
Closures

6.   Modules   (04 Periods)

Modules
Standard Modules - sys
Standard Modules - math
Standard Modules - time
The dir Function

7.   Exceptions   (04 Periods)

Errors
Runtime Errors
The Exception Model
Exception Hierarchy
Handling Multiple Exceptions
Raise
assert

8.   Input and Output   (04 Periods)

Introduction
Data Streams
Creating Your Own Data Streams
Access Modes
Writing Data to a File
Reading Data From a File
Additional File Methods
Using Pipes as Data Streams
Handling IO Exceptions

9.   Classes in Python   (06 Periods)

Classes in Python
Principles of Object Orientation
Creating Classes
Instance Methods
File Organization
Special Methods
Class Variables
Inheritance
Polymorphism

10.   Regular Expressions   (06 Periods)

Introduction
Simple Character Matches
Special Characters
Character Classes
Quantifiers
The Dot Character
Greedy Matches
Grouping
Matching at Beginning or End
Match Objects
Substituting
Splitting a String
Compiling Regular Expressions
Flags

LIST OF PRACTICALS

1.   Getting started with Python and IDLE in interactive and batch modes
2.   What do the following string methods do?
lower
count
replace
3.   Write instructions to perform each of the steps below
        (a)   Create a string containing at least five words and store it in a variable.
        (b)   Print out the string.
        (c)   Convert the string to a list of words using the string split method.
(d)   Sort the list into reverse alphabetical order using some of the list methods (you might need to use dir(list) or help(list) to find appropriate methods).
        (e)   Print out the sorted, reversed list of words.
4.   Write a program that determines whether the number is prime.
What is your favorite number? 24
        24 is not prime
        What is your favorite number? 31
        31 is prime

5.   Find all numbers which are multiple of 17, but not the multiple of 5, between 2000 and 2500?
6.   Swap two integer numbers using a temporary variable. Repeat the exercise using the code format: a, b = b, a.
Verify your results in both the cases.
7.   Find the largest of n numbers, using a user defined function largest().
8.   Write a function myReverse() which receives a string as an input and returns the reverse of the string.
Check if a given string is palindrome or not.
WAP to convert Celsius to Fahrenheit
Find the ASCII value of charades
WAP for simple calculator

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on practicals and experts from industries may be invited to deliver lectures and share experiences with the students.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests
Software installation, operation, development
Actual laboratory and practical work exercises
Viva-voce

RECOMMENDED BOOKS

1.   Learning Python by Mark Lutz; Pratham Books, Bangalore
2. Foundations of Python Network Programming by John Goerzen and BrandeuRhodes; Apress-eBook distributed by Springer Science and Business Media, New York
3.   Dive Into Python by Mark Pilgrim; Pratham Books, Bangalore
4.   Think Python by Allen B. Downey; O'Reily Media
5.   Python Programming For Beginners: A Must Read Introduction to Python Programming by Robert Richards; Pratham Books, Bangalore
6.   e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites for Reference:
        http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	04	06
2.	04	06
3.	06	10
4.	10	20
5.	08	14
6.	04	06
7.	04	06
8.	04	08
9.	06	12
10.	06	12
Total	56	100

5.4 INFORMATION SECURITY AND IT LAWS

L T P
4 - 4

RATIONALE

Contents of this course provide understanding of Information Security & theirs measures. Content of this course will enable students to use techniques like Cryptography, VPNs, IDS etc. and IT Laws in the field of Information Technology.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

Understand the need for security, Security principles related to Information Management.
Understand the various computer related attacks.
Apply different types of cryptography techniques to encrypt/decrypt data or information.
Understand the network security measures and the concept of VPNs.
Understand concept of IDS, Operating system security and web security
Understand the IT Laws and latest amendments applicable in India as well as Intellectual property laws

DETAILED CONTENTS

1. INTRODUCTION AND SECURITY TRENDS :   (06 Periods)

Need for security, Security principles, Authentication, Accesscontrol.

1.2 Threats to security : Viruses and Worms,   Intruders, Insiders, Criminalorganization, Terrorist, Information Warfare (IW), Avenues of attack, Steps in Attack.

1.3 Types of attack : Active and Passive attacks, Denial of service, backdoors and trapdoors, sniffing, spoofing, man in the middle, replay, TCP/IP Hacking, Encryption attacks, Malware : Viruses, Logic bombs.

2. ORGANIZATIONAL/ OPERATIONAL SECURITY :   (07 Periods)

2.1 Role of people in security : Password selection, Piggybacking, Shoulder surfing, Dumpster diving, Installing unauthorized software/hardware, Access by non-employees,Security awareness, Individual users responsibilities.

2.2 Physical security : Access controls Biometrics : Fingerprints, hand prints, retina, patterns, voice patterns, signature and writing patterns, keystrokes and physical barriers.

2.3 Network security basics, model for network security.

3. CRYPTOGRAPHY AND PUBLIC KEY INFRASTRUCTURE :(13 Periods)

3.1 Introduction: Cryptography, Cryptanalysis, Cryptology, Substitution techniques; Caesar's cipher, monoalphabetic and polyalphabetic transposition techniques- Rail fencetechnique, simple columnar, steganography.

3.2 Hashing - Concept

3.3 Symmetric and asymmetric cryptography : Introduction Symmetric encryption: DES (Data Encryption Standard) algorithm, Diffle-Hellman algorithm, Problem of key distribution, Asymmetric key cryptography : Digital signature, key escrow.

3.4 Public key encryption : Basics, digital certificates, certificate authorities, registration authorities, steps for obtaining a digital certificate, steps for   verifying authenticity and integrity of a certificate.

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4. NETWORK SECURITY :   (08 Periods)

4.1 Firewalls : Concept, design, principles,   limitations, trusted system, Kerberos- concept.

4.2 Security topologies - Security zones, DMZ,   Internet, Intranet, VLAN, Security implication, Tunnelling.

4.3 IP security : Overview, architecture, IPSec,   IPSec configuration, IPSec security.

4.4 Virtual Private Network.

4.5 Email security : Email security standards :   Working principles of SMTP, PEM, PGP, S/MINE, spam.

5. SYSTEM SECURITY :   (08 Periods)

5.1 Intruders, Intrusion detection system (IDS), Host Based IDS, Network based IDS.

5.2 Password Management, Vulnerability of password, Password selection strategies, Components of good password.

5.3 Operating system security : Operating system hardening, General steps for securing windows operating system, Hardening UNIX/LINUX based operating system, Updates : Hot Fix, Patch, Service pack.

6. APPLICATION AND WEB SECURITY :   (06 Periods)

6.1 Application hardening, application patches, Web servers, Active director.

6.2 Web security threats, Web traffic security approaches, Secure socket layer and transport layer security, secure electronic transaction software development : secure codetechniques, buffer overflow, code injection, least privilege, good practices, Testing.

7. IT LAWS :   (08 Periods)

7.1 Information Security Standards - ISO, IT Act, Copyright Act, Patent Law, IPR, Cyber Laws in India. IT Act 2000 Provisions and latest amendments.

7.2 Intellectual property law : Copy Right Law, Software License, Semiconductor Law and Patent Law.

LIST OF PRACTICAL

Knowledge the security provided with windows operating system.

Recovery the password of window machines using password recover utility (John the ripper) or any other utility.

Tracing of email origin using email trace pro utility.

Use of Keylogger and anti-keylogger to secure yours system.

Encrypt and decrypt the message using simple transposition - Permutation (Cryptool)

Encrypt and decrypt the message using Caesar Cipher With variable key (Cryptool)

Encrypt and decrypt the message using 3 X 3 Hill Ciper (Cryptool)

Create Digital Signature document using (Cryptool)

Send and receive secret message using stenography techniques using steghide.

Recover the data from formatted Pen Drive and Hard Disk using Power DataRecovery Utility or any other utility.

INSTRUCTONAL STRATEGY

The content of this course is to be taught on conceptual basis with real world examples. Since this subject is practice oriented, the teacher should demonstrate the capabilities of websites/Webpages to students while doing practical exercises for information security. The students should be made familiar with preventive measures for information and computer security.

MEANS OF ASSESSMENT
Assignments and quiz/class tests, mid-term and end-term written tests
Actual laboratory and practical work, exercises and viva-voce
Software installation, operation, development and viva-voce

RECOMMENDED BOOKS
Information Security Handbook by Darren Death ,Packt Publishing
Principles of Information Security by Whitman , Cengage Publisher
Cyber Security by Nina Godbole, Wiley Publisher
Introduction to Information Security And Cyber Laws by Dr. Surya Prakash Tripathi
Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley Publisher
Cryptography and Network Security - Principles and Practice by Stallings William, Pearson Education Publisher.
Cyber Law & Cyber Crimes Simplified ,by Cyber Infomedia Publisher
Information Technology Act, 2000 Along with Rules & Regulations by Universal Law Publishing
e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR, Chandigarh.
Websites for Reference:
http://swayam.gov.in
http://spoken-tutorial.org

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	10
2	07	15
3	13	15
4	08	15
5	08	15
6	06	15
7	08	15
Total		100

5.5   INTERNET OF THINGS
L T P
4 - 4
RATIONALE

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain like agriculture, space, healthcare, manufacturing, construction, water, and mining. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology. This introductory syllabus will enable learners to leverage their business and/or technical knowledge across IoT-related functions in the workplace.

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LEARNING OUTCOMES

After undergoing the subject, students will be able to:

understand the concepts of Internet of Things.
understand what constitutes an IoT design solution
identify the sensors and other devices needed for different IoT solutions
understand the component parts of an IoT network and its connections
build small IoT applications.

DETAILED CONTENTS

1. Introductionto Internet Of Things (IoT)   (10 Periods(

Introduction to IoT, Defining IoT, Things in IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT,IoTProtocols,IoT communication Models, IoT communication API's,IoT enabling Technologies.

2. IoT Devices   (12 Periods(

How electronic devices fit with the Internet of Things, and why they are important

 : *Components Electronic*Breadboard and its internal connections,Seven segment display on bread board,LED and its connections ,Tri-color LED ,Resistor
Introduction to the many 'end devices', sensors and actuators, differentiate between different sensor types

3. IoT Networks   (12 Periods(

Introduction to the components of basic IoT networks, the types of network connections and how data travels through them, and the role of Internet Protocols.Basicunderstanding of microcontrollers/Arduino and communication protocols

4. Arduino   (12 Periods(

,feature of arduino device ,Ardunino device introductionComponents of Arduino boardUnderstanding of basic of ,
 function ,control statement ,loops ,datatype ,variables : (C Language)Arduino Programming Language ,Arduino IDE

.5IoT and M2M   (10 Periods(

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software defined networking, network function virtualization, IoT and WoT.

LIST OF PRACTICALS

: Interfacing Sensors-Practical using Arduino
Installation of Arduino IDE
Interfacing Light Emitting Diode (LED)- Blinking LED
Interfacing Button and LED – LED blinking when button is pressed.
Interfacing Light Dependent Resistor (LDR) and LED, displaying automatic night lamp
Interfacing Temperature Sensor (LM35) and/or humidity sensor (e.g. DHT11)
Interfacing Liquid Crystal Display (LCD) – display data generated by sensor on LCD
Interfacing Air Quality Sensor-pollution (e.g. MQ135) - display data on LCD, switch on LED when data sensed is higher than specified value.
Interfacing Bluetooth module (e.g. HC05)- receiving data from mobile phone on Arduino and display on LCD
Interfacing Relay module to demonstrate Bluetooth based home automation application. (using Bluetooth and relay).

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study method. The teacher will discuss case studies with studentsto feel the importance of the subject , since this subject is practical oriented, the teacher should demonstrate functioning of various sensors and demonstrate building of IoT applications. Solution to various regression and classification problems should also be built

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests
viva-voce
Actual laboratory and practical work exercises
Software installation, operation, development

RECOMMENDED BOOKS

The Internet of Things: Connecting Objects to the Web,Wiley PublisherHakimaChaouchi
Internet of Things: A Hands On Approach, University Press,VijayMadisetti, ArshdeepBahga.
21 Internet Of Things (IOT) Experiments,BPB Publications YashavantKanetkar
Arduino Projects For Engineers ,BPB Publications ,Neerparaj Rai
Internet of Things – A Hands on Approach, By ArshdeepBahga and Vijay Madisetti Universities Press, ISBN: 9788173719547
The Internet of Things , Pearson, By Michael Miller ISBN: 9789332552456
e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR, Chandigarh.

Websites for Reference:
http://www.spoken-tutorial.org
http://swayam.gov.in

LIST OF COMPONENTS

1. One kit for 3-4 students : Arduino Uno, sensors(Bluetooth module(HC05), MQ135,
DHT11, breadboard , LCD, 2-relay module etc)
2. Consumables : LED, button, connecting wires, LDR, LM35, battery, etc

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	10	16
2.	12	22
3.	12	22
4.	12	22
5.	10	18
Total	56	100

L T P

- - 6

LEARNING OUTCOMES

After undergoing this subject, the student will be able to:

Use effectively oral, written and visual communication

Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.

Identify, analyze and solve problems creatively through sustained critical investigation.

Develop leadership abilities.

Apply fundamental and disciplinary concepts and methods in ways appropriate to their areas of study.

Minor project work aims at exposing the students to various industries dealing with computers. It is expected from them to get acquainted with computer environment. For this purpose, student during middle of the course are required to be sent for a period of two to four weeks at a stretch in different establishments. Depending upon the interest of students they are sent for exposure to:

Industrial practices in installation and maintenance of computers and computer networks

Fabrication of computers

Fault diagnosis and testing of computers

Industrial practices in respect of documentation and fabrication

A variety of computers and peripherals in assembly organizations

Software package development organizations

Maintenance of database

Write procedure or functions which can be attached as the library objects to the main projects

Write a procedure function to convert number of words.

Write a procedure function to convert all data function (create your own) Database connectivity, (SQL server, Oracle, Access), Library classes in C++ (same application).,

design web applications using PHP

Note: The teachers may guide /help students to identify their minor project work and check out their plan of action well in advance.

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities by him/her. The students should be guided by the respective subject teachers. Each teacher may guide a group of 4 to 5 students.

The teachers along with field supervisors/engineers will conduct performance assessment of students. Criteria for assessment will be as follows:

	Criteria	Weightage
(a)	Attendance and Punctuality	15%
(b)	Initiative in performing tasks/creating new things	30%
(c)	Relation with people	15%
(d)	Report Writing	40%