



# IDHAYA ENGINEERING COLLEGE FOR WOMEN

CHINNASALEM-606 201, KALLAKURICHI DISTRICT, TAMIL NADU, INDIA.

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai.

2(f) Status of UGC, An ISO 9001: 2015 Certified Institution

A Christian Minority Institution run by the Franciscan Sisters of the Immaculate Heart of Mary Society, Puducherry.

Phone: 04151-258325, 258326

Website: [www.iecw.edu.in](http://www.iecw.edu.in)

Email ID: [indhaya@iecw.edu.in](mailto:indhaya@iecw.edu.in)

## 1.3.2 Average percentage of courses that include experiential learning through project work/field work/ internship during last five years

### ACADEMIC YEAR 2018-19

S.No	Name of the Programme	No. of Courses
1.	B.E - Computer Science and Engineering	23
2.	B.E - Electrical and Electronics Engineering	21
3.	B.E - Electronics and Communication Engineering	25
4.	B.Tech - Information Technology	6
5.	M.E - Computer Science and Engineering	13
6.	M.E – Communication Systems	10
	Total	98



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S.No	Program Name	Program Code	Course Code	Course Name	Project Work	Field Work	Internship
1.	B.E-CSE	104	GE8151	Problem Solving and Python Programming	√		
2.	B.E-CSE	104	CS8251	Programming in C	√		
3.	B.E-CSE	104	CS8351	Digital Principles and System Design	√		
4.	B.E-CSE	104	CS8391	Data Structures	√		
5.	B.E-CSE	104	CS8392	Object Oriented Programming	√		
6.	B.E-CSE	104	CS8491	Computer Architecture	√		
7.	B.E-CSE	104	CS8492	Database Management Systems	√		
8.	B.E-CSE	104	CS8451	Design and Analysis of Algorithms	√		
9.	B.E-CSE	104	CS8493	Operating Systems	√		
10.	B.E-CSE	104	CS8494	Software Engineering	√	√	
11.	B.E-CSE	104	CS6501	Internet Programming	√		√
12.	B.E-CSE	104	CS6502	Object Oriented Analysis and Design	√		
13.	B.E-CSE	104	CS6503	Theory of Computation	√		√
14.	B.E-CSE	104	CS6504	Computer Graphics	√		
15.	B.E-CSE	104	CS6601	Distributed Systems	√		
16.	B.E-CSE	104	IT6601	Mobile Computing	√		
17.	B.E-CSE	104	CS6660	Compiler Design	√		
18.	B.E-CSE	104	CS6659	Artificial Intelligence	√	√	
19.	B.E-CSE	104	CS6703	Grid and Cloud Computing	√		
20.	B.E-CSE	104	CS6003	Ad hoc and Sensor Networks	√		
21.	B.E-CSE	104	EC6703	Embedded and Real Time Systems	√	√	√
22.	B.E-CSE	104	CS6801	Multi – Core Architectures and Programming	√		
23.	B.E-CSE	104	CS6008	Human Computer Interaction	√		
24.	B.E-EEE	105	EE8351	Digital Logic Circuits	√		
25.	B.E-EEE	105	EE8391	Electromagnetic Theory	√		
26.	B.E-EEE	105	EE8301	Electrical Machines - I	√	√	
27.	B.E-EEE	105	EC8353	Electron Devices and Circuits	√		
28.	B.E-EEE	105	EE8401	Electrical Machines - II	√		
29.	B.E-EEE	105	EE8402	Transmission and Distribution	√	√	
30.	B.E-EEE	105	EE8403	Measurements and Instrumentation	√		
31.	B.E-EEE	105	IC8451	Control Systems	√		
32.	B.E-EEE	105	EE6501	Power System Analysis	√		
33.	B.E-EEE	105	EE6503	Power Electronics	√		

*Principals*  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
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34.	B.E-EEE	105	EE6504	Electrical Machines - II	√		
35.	B.E-EEE	105	IC6501	Control Systems	√		
36.	B.E-EEE	105	EE6602	Embedded Systems	√		
37.	B.E-EEE	105	EE6603	Power System Operation and Control	√		
38.	B.E-EEE	105	EE6002	Power System Transients	√		
39.	B.E-EEE	105	EE6701	High Voltage Engineering	√		
40.	B.E-EEE	105	EE6702	Protection and Switchgear	√	√	
41.	B.E-EEE	105	EE6703	Special Electrical Machines	√		
42.	B.E-EEE	105	EE6005	Power Quality	√		
43.	B.E-EEE	105	EE6801	Electric Energy Generation, Utilization and Conservation	√		
44.	B.E-EEE	105	EE6010	High Voltage Direct Current Transmission	√		
45.	B.E-ECE	106	BE8254	Basic Electrical and Instrumentation Engineering	√	√	
46.	B.E-ECE	106	EC8252	Electronic Devices	√		
47.	B.E-ECE	106	EC8351	Electronic Circuits- I	√		√
48.	B.E-ECE	106	EC8352	Signals and Systems	√		
49.	B.E-ECE	106	EC8392	Digital Electronics	√		
50.	B.E-ECE	106	EC8391	Control Systems Engineering	√		
51.	B.E-ECE	106	EC8452	Electronic Circuits II	√		
52.	B.E-ECE	106	EC8491	Communication Theory	√	√	
53.	B.E-ECE	106	EC8451	Electromagnetic Fields	√		
54.	B.E-ECE	106	EC8453	Linear Integrated Circuits	√		
55.	B.E-ECE	106	EC6501	Digital Communication	√		
56.	B.E-ECE	106	EC6502	Principles of Digital Signal Processing	√		
57.	B.E-ECE	106	EC6503	Transmission Lines and Wave Guides	√		
58.	B.E-ECE	106	CS6303	Computer Architecture	√		
59.	B.E-ECE	106	CS6551	Computer Networks	√		
60.	B.E-ECE	106	EC6601	VLSI Design	√		
61.	B.E-ECE	106	EC6602	Antenna and Wave propagation	√		
62.	B.E-ECE	106	EC6001	Medical Electronics	√		
63.	B.E-ECE	106	EC6701	RF and Microwave Engineering	√		
64.	B.E-ECE	106	EC6702	Optical Communication and Networks	√		
65.	B.E-ECE	106	IT6005	Digital Image Processing	√		
66.	B.E-ECE	106	EC6011	Advanced Computer Architecture	√		
67.	B.E-ECE	106	EC6016	Opto Electronic Devices	√		
68.	B.E-ECE	106	EC6801	Wireless Communication	√		

*Principals*  
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69.	B.E-ECE	106	EC6802	Wireless Networks	√		
70.	B.Tech-IT	205	IT8201	Information Technology Essentials	√		
71.	B.Tech-IT	205	IT6501	Graphics and Multimedia	√		
72.	B.Tech-IT	205	IT6503	Web Programming	√	√	
73.	B.Tech-IT	205	IT6602	Software Architectures	√	√	
74.	B.Tech-IT	205	IT6702	Data Ware Housing and Data Mining	√		
75.	B.Tech-IT	205	IT6801	Service Oriented Architecture	√		
76.	M.E-CSE	405	CP5151	Advanced Data Structures and Algorithms	√		
77.	M.E-CSE	405	CP5153	Operating System Internals	√		
78.	M.E-CSE	405	CP5154	Advanced Software Engineering	√		
79.	M.E-CSE	405	CP5191	Machine Learning Techniques	√		
80.	M.E-CSE	405	CP5201	Network Design and Technologies	√		
81.	M.E-CSE	405	CP5291	Security Practices	√		
82.	M.E-CSE	405	CP5292	Internet of Things	√		
83.	M.E-CSE	405	CP5293	Big Data Analytics	√		
84.	M.E-CSE	405	CP5092	Cloud Computing Technologies	√		
85.	M.E-CSE	405	CP5094	Information Retrieval Techniques	√		
86.	M.E-CSE	405	CP5005	Software Quality Assurance and Testing	√		
87.	M.E-CSE	405	CP5073	Embedded Software Development	√		
88.	M.E-CSE	405	CP5097	Mobile Application Development	√		
89.	M.E-CS	403	CU5191	Advanced Radiation Systems	√		
90.	M.E-CS	403	CU5151	Advanced Digital Communication Techniques	√		
91.	M.E-CS	403	AP5152	Advanced Digital Signal Processing	√		
92.	M.E-CS	403	CU5091	Advanced Satellite Communication and Navigation Systems	√		
93.	M.E-CS	403	CU5291	Advanced Wireless Communication Systems	√		
94.	M.E-CS	403	CU5201	MIC and RF System Design	√		
95.	M.E-CS	403	CU5071	Digital Communication Receivers	√		
96.	M.E-CS	403	DS5291	Advanced Digital Image processing	√		
97.	M.E-CS	403	MU5091	Multimedia Compression Techniques	√		
98.	M.E-CS	403	NC5291	Communication Network Security	√		

*Dr. R. Gurumani*  
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**OBJECTIVES:**

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.

**UNIT I ALGORITHMIC PROBLEM SOLVING 9**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

**UNIT II DATA, EXPRESSIONS, STATEMENTS 9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

**UNIT III CONTROL FLOW, FUNCTIONS 9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, **string functions and methods**, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

**UNIT IV LISTS, TUPLES, DICTIONARIES 9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

**UNIT V FILES, MODULES, PACKAGES 9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

**TOTAL: 45 PERIODS****OUTCOMES:****Upon completion of the course, students will be able to**

- Develop algorithmic solutions to simple computational problems
- Read, write, execute by hand simple Python programs..
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.

**TEXT BOOKS:**

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

**REFERENCES:**

1. John V Guttag, —Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, Practical Programming: An Introduction to Computer Science using Python 3, Second edition, Pragmatic Programmers, LLC, 2013.

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**Road Scene Content Analysis for Driver  
Assistance and Autonomous  
Driving**



**A PROJECT REPORT**

*Submitted by*

**PRIYA.S** 621114104040

**SANTHIYA.S** 621114104043

**SHOBANA.S** 621114104048

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**COMPUTER SCIENCE AND ENGINEERING**


**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY :: CHENNAI-600 025**

**APRIL 2019**

i

  
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ANNA UNIVERSITY: CHENNAI-600 025

BONAFIDE CERTIFICATE

Certified that this project report "ROAD SCENE CONTENT ANALYSIS FOR DRIVER ASSISTANCE AND AUTONOMOUS DRIVING" is the bonafide work of "S.PRIYA, S.SANTHIYA, S.SHOBANA" who carried out the project work under my supervision.

  
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INTERNAL EXAMINER

  
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ii

  
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## ABSTRACT

This project aims to develop a vision-based driver assistance system for scene awareness using video frames obtained from a dashboard camera. A saliency image map is devised with features pertinent to the driving scene. This saliency map mimics the human contour and motion sensitive visual perception by extracting spatial, spectral, and temporal information from the input frames and applying entropy driven image-context-feature data fusion. The resultant fusion output comprises high-level descriptors for still segment boundaries and non-stationary object appearance. Following the segmentation and foreground object detection stage, an adaptive maximum likelihood classifier selects road surface regions. The proposed scene driven vision system improves the driver's situational awareness by enabling adaptive road surface classification. As experimental results demonstrate, context-aware low-level to high-level information fusion based on human vision model produces superior segmentation, tracking, and classification results that lead to high- level abstraction of driving scene.





**USER BEHAVIOUR VERIFICATION  
FOR CLOUD STORAGE SECURITY**



**A PROJECT REPORT**

*Submitted by*

**ARTHLA**

621115104007

**JAYAPRATHA.R**

621115104018

**MANJUN**

621115104032

*in partial fulfillment for the award of the degree*

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**BONAFIDE CERTIFICATE**

Certified that this project report "USER BEHAVIOR VERIFICATION FOR CLOUD STORAGE SECURITY" is the bonafide work of "A.ARTHI"(Reg.No.621115104007),"R.JAYAPRATHA"(Reg.No.621115104018),"M.MANJU"(Reg.No.621115104032) who carried out their project work under my supervision.

  
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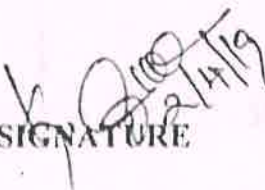
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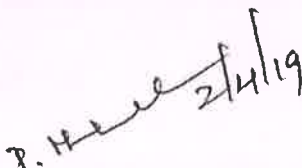
Mrs.K. GANDHIMADHIL., M.E.

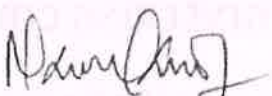
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## ABSTRACT

Cloud computing is the next phase in the Internet's evolution, providing the means through which computing power, computing infrastructure, applications, business processes can be delivered to businesses and individual as a service wherever and whenever they need. User does not have the time, feasibility or resources to perform the storage correctness verification, at that instance user can optionally delegate this task to an independent monitoring data and making the cloud storage publicly verifiable. The monitoring process is to verify the data between the users. Perception Hanoi monitoring algorithms (PHM) used to monitor the data for security consideration on which one should be used for Cloud based applications and services that require data and then if unauthorized users can access the login to store the unauthorized persons details in data base. Open Key Encryption Algorithm based on Symmetric Algorithms for security consideration on which one should be used for Cloud based applications and services that require data and link encryption. The auditing result not only achieves the fast data error identifying the misbehaving server but also ensures strong cloud storage correctness guarantee.

**OBJECTIVES:**

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions , pointers and structures
- To do input/output and file handling in C

**UNIT I BASICS OF C PROGRAMMING**

9

Introduction to programming paradigms - Structure of C program - C programming: Data Types –Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives - Compilation process

**UNIT II ARRAYS AND STRINGS**

9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search

**UNIT III FUNCTIONS AND POINTERS**

9

Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers –Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

**UNIT IV STRUCTURES**

9

Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Self referential structures – Dynamic memory allocation - Singlylinked list - typedef

**UNIT V FILE PROCESSING**

9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments

**OUTCOMES:**

Upon completion of the course, the students will be able to

- Develop simple applications in C using basic constructs
- Design and implement applications using arrays and strings
- Develop and implement applications in C using functions and pointers.
- Develop applications in C using structures.
- Design applications using sequential and random access file processing.

**TEXT BOOKS:**

1. Reema Thareja, —Programming in C, Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, —The C Programming language, Second Edition,Pearson Education, 2006

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, —C How to Program, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India Pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, DorlingKindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

*Ruveni*  
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**Automatic Detection of Retinal Lesions  
for Screening of Diabetic Retinopathy**



**A PROJECT REPORT**

*Submitted by*

**S.KAYALVIZHI**

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**A.LAKSHMI**

621115104027

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BONAFIDE CERTIFICATE

Certified that this project report "AUTOMATIC DETECTION OF RETINAL LESIONS FOR SCREENING OF DIABETIC RETINOPATHY" is the bonafide work of "S.KAYALVIZHI, A.LAKSHMI, H.SHABEENA" who carried out the project work under my supervision.

  
SIGNATURE

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Mr S. PRABAKARAN

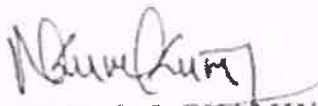
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## ABSTRACT

Diabetic Retinopathy(DR) is human eye disease among people with diabetics which is characterized by the progressive deterioration of retina with the appearance of different types of lesions that include micro aneurysms, hemorrhages, exudates etc. Detection of these lesions plays a significant role for early diagnosis of DR. The objective of our thesis is to give automated lesion detection scheme which consists of four main steps are vessel extraction and optic disc removal, preprocessing, candidate lesion detection and post processing. The optic disc and blood vessels are suppressed to facilitate further processing. Curvelet based edge enhancement is done to separate out dark lesions from the poorly illuminated retinal background while the contrast between the bright lesions and the background is enhanced through an optimally designed bandpass filter. It will give us accuracy of which algorithm will be suitable and more accurate for prediction of the disease. Decision making for predicting the presence of diabetic retinopathy is performed using Support Vector Machine, Gray level co occurrence matrix and Neural Networks.

**OBJECTIVES:**

- To design digital circuits using simplified Boolean functions
- To analyze and design combinational circuits
- To analyze and design synchronous and asynchronous sequential circuits
- To understand Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

<b>UNIT I</b>	<b>BOOLEAN ALGEBRA AND LOGIC GATES</b>	<b>12</b>
Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.		
<b>UNIT II</b>	<b>COMBINATIONAL LOGIC</b>	<b>12</b>
Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers - Introduction to HDL – HDL Models of Combinational circuits.		
<b>UNIT III</b>	<b>SYNCHRONOUS SEQUENTIAL LOGIC</b>	<b>12</b>
Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.		
<b>UNIT IV</b>	<b>ASYNCHRONOUS SEQUENTIAL LOGIC</b>	<b>12</b>
Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.		
<b>UNIT V</b>	<b>MEMORY AND PROGRAMMABLE LOGIC</b>	<b>12</b>
RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.		

**TOTAL : 60 PERIODS**

**OUTCOMES:**

**On Completion of the course, the students should be able to:**

- Simplify Boolean functions using KMap
- Design and Analyze Combinational and Sequential Circuits
- Implement designs using Programmable Logic Devices
- Write HDL code for combinational and Sequential Circuits

**TEXT BOOK:**

1. M. Morris R. Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6<sup>th</sup> Edition, Pearson Education, 2017.

**REFERENCES:**

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2010
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013
4. Donald D. Givone, Digital Principles and Design, Tata Mc Graw Hill, 2003.

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**ON CRITICAL SERVICE RECOVAERY  
AFTER MASSIVE NETWORK  
FAILURES**



**A PROJECT REPORT**

*Submitted by*

**KARPAGAVALLN**

621115104021

**MAHALAKSHMI.R**

621115104030

**ROOBINI.V**

621115104042

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**COMPUTER SCIENCE AND ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

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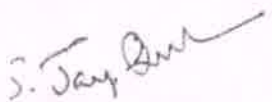
**APRIL 2019**

  
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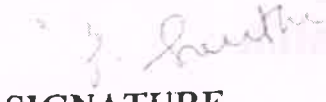
BONAFIDE CERTIFICATE

Certified that this project report on "ON CRITICAL SERVICE RECOVERY AFTER MASSIVE NETWORK FAILURES" is the bonafide work of "N.KARPAGAVALLI, R.MAHALAKSHMI, V.ROOBINI" who carried out the project work under my supervision.

  
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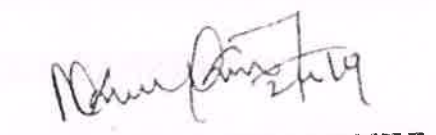
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EXTERNAL EXAMINER

  
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## ABSTRACT

This project addresses the problem of efficiently restoring sufficient resources in a communications network to support the demand of mission critical services after a large-scale disruption. We give a formulation of the problem as a mixed integer linear programming and show that it is NP-hard. We propose a polynomial time heuristic, called iterative split and prune (ISP) that decomposes the original problem recursively into smaller problems, until it determines the set of network components to be restored. ISP's decisions are guided by the use of a new notion of demand-based centrality of nodes. We performed extensive simulations by varying the topologies, the demand intensity, the number of critical services, and the disruption model. Compared with several greedy approaches, ISP performs better in terms of total cost of repaired components, and does not result in any demand loss. It performs very close to the optimal when the demand is low with respect to the supply network capacities, thanks to the ability of the algorithm to maximize sharing of repaired resources.

**OBJECTIVES:**

- To understand the concepts of ADTs
- To Learn linear data structures – lists, stacks, and queues
- To understand sorting, searching and hashing algorithms
- To apply Tree and Graph structures

**UNIT I LINEAR DATA STRUCTURES – LIST** 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists- circularly linked lists- doubly-linked lists – applications of lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

**UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES** 9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

**UNIT III NON LINEAR DATA STRUCTURES – TREES** 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

**UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS** 9

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

**UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES** 9

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

**TOTAL: 45 PERIODS****OUTCOMES:**

**At the end of the course, the student should be able to:**

- Implement abstract data types for linear data structures.
- Apply the different linear and non-linear data structures to problem solutions.
- Critically analyze the various sorting algorithms.

**TEXT BOOKS:**

1. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson Education, 1997.
2. Reema Thareja, —Data Structures Using C++, Second Edition, Oxford University Press, 2011.

**REFERENCES:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, —Data Structures and Algorithms", Pearson Education, 1983.
3. Stephen G. Kochan, —Programming in C++, 3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C++, Second Edition, University Press, 2008.

**OBJECTIVES:**

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

**UNIT I OPERATING SYSTEM OVERVIEW** 7

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

**UNIT II PROCESS MANAGEMENT** 11

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, **Methods for handling deadlocks**, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

**UNIT III STORAGE MANAGEMENT** 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

**UNIT IV FILE SYSTEMS AND I/O SYSTEMS** 9

Mass Storage system — Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems — I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

**UNIT V CASE STUDY** 9

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

**TOTAL : 45 PERIODS****OUTCOMES:****At the end of the course, the students should be able to:**

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems.
- Perform administrative tasks on Linux Servers.
- Compare iOS and Android Operating Systems.

**TEXT BOOK :**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne. —Operating System Concepts, 9<sup>th</sup> Edition, John Wiley and Sons Inc., 2012.

**REFERENCES :**

1. Ramaz Elmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approach, Tata McGraw Hill Edition, 2010.
2. Achyut S. Godbole, Atul Kahate, —Operating Systems, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, —Modern Operating Systems, Second Edition, Pearson Education, 2004.
4. Gary Nutt, —Operating Systems, Third Edition, Pearson Education, 2004.
5. Harvey M. Deitel, —Operating Systems, Third Edition, Pearson Education, 2004.
6. Daniel P Bovet and Marco Cesati, —Understanding the Linux kernel, 3rd edition, O'Reilly, 2005.
7. Neil Smyth, —iPhone iOS 4 Development Essentials – Xcode, Fourth Edition, Payload media, 2011.

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**A ROBUST AND SECURE AGGRIGATION  
PROTOCOL FOR WIRELESS SENSOR  
NETWORKS**



**A PROJECT REPORT**

*Submitted by*

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621115104053

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BONAFIDE CERTIFICATE

Certified that this project report "A ROBUST AND SECURE AGGREGATION PROTOCOL FOR WIRELESS SENSOR NETWORKS" is the bonafide work of "M. MALARVIZHI, K. SHARMILA, M. SULOCHANA" who carried out the project work under my supervision.

  
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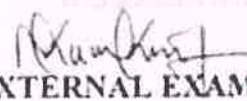
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## ABSTRACT

Wireless sensor network (WSN) is to provide the users with access to the information of interest from data gathered by spatially distributed sensors. Generally, the users require only certain aggregate functions of this distributed data. Computation of this aggregate data under the end-to-end information flow paradigm by communicating all the relevant data to a central collector node is a highly inefficient solution for this purpose. An alternative proposition is to perform in-network computation. This, however, raises questions such as: what is the optimal way to compute an aggregate function from a set of statistically correlated values stored in different nodes; what is the security of such aggregation as the results sent by a compromised or faulty node in the network can adversely affect the accuracy of the computed result. In this paper, we have presented an energy efficient aggregation algorithm for WSNs that is secure and robust against malicious insider attack by any compromised or faulty node in the network. In contrast to the traditional snapshot aggregation approach in WSNs, a node in the proposed algorithm instead of unicasting its sensed information to its parent node, broadcasts its estimate to all its neighbors. This makes the system more fault-tolerant and increase the information availability in the network. The simulations conducted on the proposed algorithm have produced results that demonstrate its effectiveness.



CS8491

COMPUTER ARCHITECTURE

L T P C  
3 0 0 3

OBJECTIVES:

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices.

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM 9

Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT II ARITHMETIC FOR COMPUTERS 9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT 9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISIM 9

Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT V MEMORY & I/O SYSTEMS 9

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

TOTAL : 45 PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:


- Understand the basics structure of computers, operations and instructions.
- Design arithmetic and logic unit.
- Understand pipelined execution and design control unit.
- Understand parallel processing architectures.
- Understand the various memory systems and I/O communication.

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

  
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**OBJECTIVES**

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
- To have an introductory knowledge about the Storage and Query processing Techniques

**UNIT I RELATIONAL DATABASES**

10

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL – Dynamic SQL

**UNIT II DATABASE DESIGN**

8

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

**UNIT III TRANSACTIONS**

9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

**UNIT IV IMPLEMENTATION TECHNIQUES**

9

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

**UNIT V ADVANCED TOPICS**

9

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL - XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

**TOTAL: 45 PERIODS****OUTCOMES:****Upon completion of the course, the students will be able to:**

- Classify the modern and futuristic database applications based on size and complexity
- Map ER model to Relational model to perform database design effectively
- Write queries using normalization criteria and optimize queries
- Compare and contrast various indexing strategies in different database systems
- Appraise how advanced databases differ from traditional databases.

**TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri, Shamkant B. Navathe, —Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2011.

**REFERENCES:**

1. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
3. G.K.Gupta, "Database Management Systems, Tata McGraw Hill, 2011.

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**OBJECTIVES:**

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

**UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS**

10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance -Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

**UNIT II INHERITANCE AND INTERFACES**

9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- theObject class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

**UNIT III EXCEPTION HANDLING AND I/O**

9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – **Byte streams and Character streams** – Reading and Writing Console – Reading and Writing Files

**UNIT IV MULTITHREADING AND GENERIC PROGRAMMING**

8

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

**UNIT V EVENT DRIVEN PROGRAMMING**

9

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events -AWT event hierarchy - Introduction to Swing – layout management - Swing Components – Text

Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

**TOTAL: 45 PERIODS****OUTCOMES:**

**Upon completion of the course, students will be able to:**

- Develop Java programs using OOP principles
- Develop Java programs with the concepts inheritance and interfaces
- Build Java applications using exceptions and I/O streams
- Develop Java applications with threads and generics classes
- Develop interactive Java programs using swings

**TEXT BOOKS:**

1. Herbert Schildt, —Java The complete reference!, 8<sup>th</sup> Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentals!, 9<sup>th</sup> Edition,Prentice Hall, 2013.

**REFERENCES:**

1. Paul Deitel, Harvey Deitel, —Java SE 8 for programmers!, 3<sup>rd</sup> Edition, Pearson, 2015.
2. Steven Holzner, —Java 2 Black book!, Dreamtech press, 2011.
3. Timothy Budd, —Understanding Object-oriented programming with Javal, Updated Edition, Pearson Education, 2000.

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**AN ONTOLOGY BASED SERVICE  
DISCOVERY USING SEMANTIC  
INFORMATION RETRIEVAL ON  
CLOUD COMPUTING**



A PROJECT REPORT

Submitted by

**J. ABIRAMI**

621115104002

**M. MOHANA PRIYA**

621115104035

**R. SIVARANJANI**

621115104050

in partial fulfillment for the award of the degree  
Of  
**BACHELOR OF ENGINEERING**  
IN  
**COMPUTER SCIENCE AND ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN  
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**APRIL 2019**

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ANNA UNIVERSITY: CHENNAI 600 025

**BONAFIDE CERTIFICATE**

Certified that this project report "AN ONTOLOGY BASED SERVICE DISCOVERY USING SEMANTIC INFORMATION RETRIEVAL ON CLOUD COMPUTING" is the bonafide work of **J.ABIRAMI** (621115104002), **M.MOHANA PRIYA** (621115104035), **R.SIVARANJANI** (621115104050)" who carried out the project under my supervision.

  
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**SOFTWARE ENGINEERING**

L T P C  
3 0 0 3

**OBJECTIVES:**

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures

**UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process.

**UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9**

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document — Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

**UNIT III SOFTWARE DESIGN 9**

Design process — Design Concepts-Design Model– Design Heuristic — Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design — Component level Design: Designing Class based components, traditional Components.

**UNIT IV TESTING AND MAINTENANCE 9**

Software testing fundamentals-Internal and external views of Testing-white box testing - basispath testing-control structure testing-black box testing- Regression Testing — Unit Testing — Integration Testing — Validation Testing — System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

**UNIT V PROJECT MANAGEMENT 9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

**TOTAL :45 PERIODS**

**OUTCOMES:**

**On Completion of the course, the students should be able to:**

- Identify the key activities in managing a software project.
- Compare different process models.
- Concepts of requirements engineering and Analysis Modeling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.
- Manage project schedule, estimate project cost and effort required.

**TEXT BOOKS:**

1. Roger S. Pressman, —Software Engineering – A Practitioner’s Approach, Seventh Edition, McGraw-Hill International Edition, 2010.
2. Ian Sommerville, —Software Engineering, 9th Edition, Pearson Education Asia, 2011.

**REFERENCES:**

1. Rajib Mall, —Fundamentals of Software Engineering, Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, —Software Engineering, A Precise Approach, Wiley India, 2010.
3. Kelkar S.A., —Software Engineering, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, —Software Engineering, Tata McGraw-Hill Publishing Company Limited, 2007.
5. <http://nptel.ac.in/>.

*Dr. R. Gurumani*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201, KALLAKURICHI DT.**

**OBJECTIVES:****The student should be made to:**

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and machine learning.

<b>UNIT I</b>	<b>INTRODUCTION TO AI AND PRODUCTION SYSTEMS</b>	<b>9</b>
	Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breadth first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.	
<b>UNIT II</b>	<b>REPRESENTATION OF KNOWLEDGE</b>	<b>9</b>
	Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.	
<b>UNIT III</b>	<b>KNOWLEDGE INFERENCE</b>	<b>9</b>
	Knowledge representation -Production based system, <b>Frame based system.</b> Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.	
<b>UNIT IV</b>	<b>PLANNING AND MACHINE LEARNING</b>	<b>9</b>
	Basic plan generation systems - Strips -Advanced plan generation systems — K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.	
<b>UNIT V</b>	<b>EXPERT SYSTEMS</b>	<b>9</b>
	Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition — Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.	

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalise a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

**TEXT BOOKS:**

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008.(Units-I,II,VI & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

**REFERENCES:**

1. Peter Jackson, "Introduction to Expert Systems", 3<sup>rd</sup> Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2<sup>nd</sup> Edition, Pearson Education 2007.
3. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.
4. <http://nptel.ac.in>


  
PRINCIPAL

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## Plant visit-Requisition Letter

**Jai sundar <chisundar123@gmail.com>** Tue, Feb 12, 12:00 PM (3 days ago)

to contact

Dear Sir/Mam,

We are seeking your permission to visit your development center for Final year CSE and IT students on 16.2.19.of total strength 65 students.Kindly accept our request and send me the confirmation.

Regards,  
Dr.S.Jayasundar,  
HoD/CSE,  
Idhaya Engineering College For Women,  
Chinnasalem.  
Contact No 9500977484

**contact@yassofttech.com** Tue, Feb 12, 2:25 PM (3 days ago)

to me

Dear Sir,

With reference to your mail, we are glad to give permission to your final year students to visit our Company on 16.02.2019 (Saturday).

Time Allocated: 9:00 AM to 11:00 AM  
Maximum 25 students for batch can accommodated.  
Each batch maximum 15 mins will be allocated.

With Regards,  
Managing Director  
YAS SoftTech

Thank you for your response.  
Thanks a lot.  
Thank you for the information.

*Mani*  
**Dr.R.GURUMANI**,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHUR



**Selva Nayagam <selvairt@gmail.com>** Tue, Feb 12, 1:55 PM (3 days ago)

to me

Respected Sir,

This is the acceptance letter which we are sending on behalf of students of **IDAYA ENGINEERING COLLEGE of CSE and IT Students (2<sup>nd</sup> year and 3<sup>rd</sup> year)** and we are sending this acceptance letter for our academic purposes. We are pleased that you and your students are interested in touring our Industrial Visit to learn more about us and the Research and Development Industry. I would like to schedule a day and time that are mutually agreeable for the Research and Development Industry Training on the coming 16<sup>th</sup> of Saturday. We hope to make this experience one that will be useful to you and your students to help educate them regarding what our company Developed and gain a better understanding of the Research and Development Industry.

With Best Regards,

**Mr. S. SELVANAYAGAM**  
**CHIEF EXECUTIVE OFFICER**  
**IMMACULATE TECHNOLOGIES**

  
**Dr.R.GURUMANI**,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.I.E.  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT**



## IMMACULATE TECHNOLOGIES

### **IDHAYA ENGINEERING COLLEGE FOR WOMEN (IECW)**

Nainnarpalayam Road,  
Chinnasalem,  
Tamil Nadu 606201

Dear Sir,

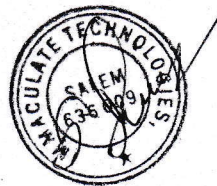
Thank you for taking the time to visit our Immaculate Technologies. This is the thanking letter which we are sending on behalf of students of **IDAYA ENGINEERING COLLEGE of CSE - 2<sup>nd</sup> year and 3<sup>rd</sup> year** on Saturday (16/02/2019). We hope that the visit helped to make clear experience one that will be useful to you and your students to help educate them regarding what our company Developed and gain a better understanding of the Research and Development Industry. Thank you for providing me such opportunity to behalf with you.

Thank you again for sharing your valuable time with us.

Sincerely,

**Mr. S. SELVANAYAGAM**  
**CHIEF EXECUTIVE OFFICER**  
**IMMACULATE TECHNOLOGIES**

No.476, Anna Street,  
Angammal Colony,  
New Bus Stand Back Side,  
Salem-9.



*R. Guramani*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

Ref: YAS/INV/2019/001

Date:16/02/2019

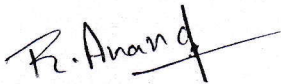
### INDUSTRIAL VISIT CERTIFICATE

This is to certified that Final year B.E CSE and B.Tech IT students of Idhaya Engineering College For Women, Chinnasalem, has visited our company as Industrial Visit Program and successfully participated and gained knowledge about technologies that we are using in project development during **February 16<sup>th</sup>, 2019.**

During the period of visit, Students shown great amount of responsibility, sincerity and genuine willingness to learn and zeal to learn new technology and challenges.

We wish them all the best for future.

With regards,

  
Anandkrishnan.R  
Managing Director



  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.

**OBJECTIVES:**

The student should be made to:

- Learn Java Programming.
- Understand different Internet Technologies.
- Be exposed to java specific web services architecture.

**UNIT I JAVA PROGRAMMING 9**

An overview of Java — Data Types — Variables and Arrays — Operators — Control Statements — Classes — Objects — Methods — Inheritance - Packages — Abstract classes — Interfaces and Inner classes — Exception handling - Introduction to Threads — Multithreading — String handling — Streams and I/O — Applets.

**UNIT II WEBSITES BASICS, HTML 5, CSS 3, WEB 2.0 8**

**Web 2.0:** Basics-RIA Rich Internet Applications - Collaborations tools - **Understanding websites and web servers:** Understanding Internet — Difference between websites and web server- Internet technologies Overview —Understanding the difference between internet and intranet; **HTML and CSS:** HTML 5.0 , XHTML, CSS 3.

**UNIT III CLIENT SIDE AND SERVER SIDE PROGRAMMING 11**

**Java Script:** An introduction to JavaScript—JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript. **Servlets:** Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- **Understanding Cookies-** Installing and Configuring Apache Tomcat Web Server;- **DATABASE CONNECTIVITY:** JDBC perspectives, JDBC program example - **JSP:** Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating HTML forms by embedding JSP code.

**UNIT IV PHP and XML 8**

**An introduction to PHP:** PHP- Using PHP- Variables- Program control- Built-in functions-Connecting to Database — Using Cookies- Regular Expressions; **XML:** Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

**UNIT V INTRODUCTION TO AJAX and WEB SERVICES 9**

**AJAX:** Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; **Web Services:** Introduction- Java web services Basics — Creating, Publishing ,Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application — SOAP.

**TOTAL (L:45+T:15): 60 PERIODS**

**OUTCOMES:**

At the end of the course, the student should be able to:

- Implement Java programs.
- Create a basic website using HTML and Cascading Style Sheets.
- Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple web page in PHP, and to present data in XML format.
- Design and implement server side programs using Servlets and JSP.

**TEXT BOOKS:**

1. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5<sup>th</sup> Edition, 2011.
2. Herbert Schildt, "Java-The Complete Reference", Eighth Edition, Mc Graw Hill Professional, 2011.

**REFERENCES:**

1. Stephen Wynnkoop and John Burke "Running a Perfect Website", QUE, 2<sup>nd</sup> Edition, 1999.
2. Chris Bates, Web Programming — Building Intranet Applications, 3<sup>rd</sup> Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
5. Paul Dietel and Harvey Deitel, "Java How to Program", , 8<sup>th</sup> Edition Prentice Hall of India.
6. Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011.
7. Uttam K. Roy, "Web Technologies", Oxford University Press, 2011

*Principals*  
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Kallakurichi Taluk, Villupuram District



**MAPPING WORDS WITH BUGS REPORT**

**USING BUG TRIAGING**



**A PROJECT REPORT**

*Submitted by*

**BHARATHI.S**

621115205002

**SHARMILA DEVI.S**

621115205011

**SUMITHRA.S**

621115205014

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF TECHNOLOGY**

*in*

**INFORMATION TECHNOLOGY**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY :: CHENNAI-600 025**

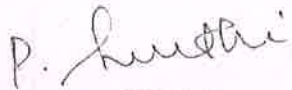
**APRIL 2019**

*Dr. R. Gurumani*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
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**CHINNASALEM-605 281, KALLAKURICHI DT.**

**ANNA UNIVERSITY : CHENNAI-600 025**

**BONAFIDE CERTIFICATE**

Certified that this project report "MAPPING WORDS WITH BUGS REPORT USING BUG TRIAGING" is the bonafide work of "BHARATHI.S,SHARMILA DEVI.N,SUMITHRA.S" who carried out the project work under my supervision.



**SIGNATURE**


Ms.P.SUMATHI., M.E.

**HEAD OF THE DEPARTMENT**

Assistant Professor/IT,

Idhaya engineering college for women,

Chinnasalem-606 201.



**SIGNATURE**

Dr.S.JAYASUNDAR., M.E., Ph.D,M.B.A.,

**SUPERVISOR**

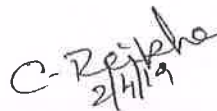
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**INTERNAL EXAMINER**



**EXTERNAL EXAMINER**



**Dr.R.GURUMANI,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.IE.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

## ABSTRACT

Bug triaging refers to the process of assigning a bug to the most appropriate developer to fix. It becomes more and more difficult and complicated as the size of software and the number of developers increase. In this paper, we included a new framework for bug triaging, which maps the words in the bug reports (i.e., the term space) to their corresponding topics (i.e., the topic space). We added a specialized topic modeling algorithm named multi-feature topic model (MTM) which extends Latent Dirichlet Allocation (LDA) for bug triaging. MTM considers product and component information of bug reports to map the term space to the topic space. Finally, we mentioned an incremental learning method named Topic Miner which considers the topic distribution of a new bug report to assign an appropriate fixer based on the affinity of the fixer to the topics. We pair Topic Miner with MTM (Topic Miner MTM).



**FRAUD ANALYSIS WITH ZERO MINUTE**

**TROJEN DETECTION SYSTEM IN**

**GOOGLE PLAY**



**A PROJECT REPORT**

*Submitted by*

**ANITHA.A**

621115104005

**BHARATHI.P**

621115104011

**GEJALAKSHMI.S**

621115104017

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**COMPUTER SCIENCE AND ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY :: CHENNAI-600 025**

**APRIL 2019**

  
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**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201, KALLAKURICHI DT.**



## BONAFIDE CERTIFICATE

Certified that this project report "FRAUD ANALYSIS WITH ZERO MINUTE TROJEN DETECTION SYSTEM IN GOOGLE PLAY" is the bonafide work of "A.ANITHA, P.BHARATHI, S.GEJALAKSHMI" who carried out the project work under my supervision.

  
SIGNATURE

Dr.S. JAYASUNDAR., M.E.,MBA., Ph.D

HEAD OF THE DEPARTMENT

Associate Professor/CSE,

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SIGNATURE

Mrs.K. GANDHIMADHI., M.E.

SUPERVISOR


Associate Professor/CSE,

Idhaya Engineering College for Women,

Chinnasalem-606 201.

  
INTERNAL EXAMINER

  
EXTERNAL EXAMINER

  
Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
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## ABSTRACT

Fraudulent behaviors in Google Play, the most popular Android app market, fuel search rank abuse and malware proliferation. To identify malware, previous work has focused on app executable and permission analysis. In this project, we introduce FairPlay, a novel system that discovers and leverages traces left behind by fraudsters, to detect both malware and apps subjected to search rank fraud. FairPlay correlates review activities and uniquely combines detected review relations with linguistic and behavioral signals gleaned from Google Play app data (87K apps, 2.9M reviews, and 2.4M reviewers, collected over half a year), in order to identify suspicious apps. FairPlay achieves over 95% accuracy in classifying gold standard datasets of malware, fraudulent and legitimate apps. We show that 75% of the identified malware apps engage in search rank fraud. FairPlay discovers hundreds of fraudulent apps that currently evade Google Bouncer's detection technology.

**OBJECTIVES:****The student should be made to:**

- Gain knowledge about graphics hardware devices and software used.
- Understand the two dimensional graphics and their transformations.
- Understand the three dimensional graphics and their transformations.
- Be familiar with understand clipping techniques.

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9</b>
Survey of computer graphics, Overview of graphics systems — Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.		
<b>UNIT II</b>	<b>TWO DIMENSIONAL GRAPHICS</b>	<b>9</b>
Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.		
<b>UNIT III</b>	<b>THREE DIMENSIONAL GRAPHICS</b>	<b>10</b>
Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations — Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling; Three dimensional viewing — viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.		
<b>UNIT IV</b>	<b>ILLUMINATION AND COLOUR MODELS</b>	<b>7</b>
Light sources - basic illumination models — halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model; Colour selection.		
<b>UNIT V</b>	<b>ANIMATIONS &amp; REALISM</b>	<b>10</b>
<b>ANIMATION GRAPHICS:</b> Design of Animation sequences – animation function – raster animation –key frame systems – motion specification –morphing – tweening. <b>COMPUTER GRAPHICS REALISM:</b> Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.		

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Design two and three dimensional graphics.
- Apply two and three dimensional transformations.
- Apply Illumination and color models.
- Apply clipping techniques to graphics.
- Design animation sequences.

**TEXT BOOKS:**

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,”Computer Graphics: Principles and Practice”, 3<sup>rd</sup> Edition, Addison-Wesley Professional,2013. (UNIT I, II, III, IV).
2. Donald Hearn and Pauline Baker M, “Computer Graphics”, Prentice Hall, New Delhi, 2007(UNIT V).

**REFERENCES:**

1. Donald Hearn and M. Pauline Baker, Warren Carithers,“Computer Graphics With Open GL”,4<sup>th</sup> Edition, Pearson Education, 2010.
2. Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers,2006. .
3. Hill F S Jr., "Computer Graphics", Maxwell Macmillan”, 1990.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010.
5. William M. Newman and Robert F.Sproull, “Principles of Interactive Computer Graphics”, Mc GrawHill 1978.
6. <http://nptel.ac.in/>


  
PRINCIPAL

Idhaya Engineering College for Women  
Vainarpalayam Road, CHINNASALEM-606201  
Kallakurichi Taluk, Villupuram District



**USER BEHAVIOUR VERIFICATION  
FOR CLOUD STORAGE SECURITY**



**A PROJECT REPORT**

*Submitted by*

**ARTHLA**

621115104007

**JAYAPRATHA.R**

621115104018

**MANJUM**

621115104032

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**COMPUTER SCIENCE AND ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY: CHENNAI-600 025**

**APRIL 2019**

  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL**

**IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.**

**ANNA UNIVERSITY: CHENNAI-600 025**

**BONAFIDE CERTIFICATE**

Certified that this project report "USER BEHAVIOR VERIFICATION FOR CLOUD STORAGE SECURITY" is the bonafide work of "A.ARTHI"(Reg.No.621115104007),"R.JAYAPRATHA"(Reg.No.621115104018),"M.MANJU"(Reg.No.621115104032) who carried out their project work under my supervision.

  
SIGNATURE

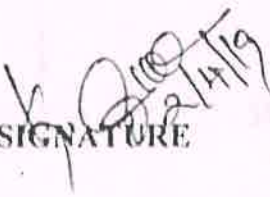
Dr.S. JAYASUNDHAR., M.E., Ph.D., MBA

**HEAD OF THE DEPARTMENT**

Assistant Professor/CSE,

Idhaya engineering college for women,

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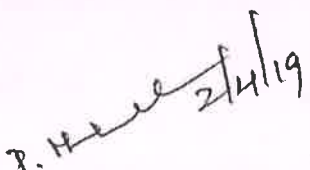
Mrs.K. GANDHIMADHIL., M.E.

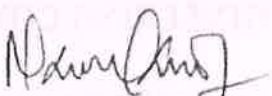
**SUPERVISOR**

Associate Professor/CSE,

Idhaya engineering college for women

Chinnasalem-606 201.

  
INTERNAL EXAMINER

  
EXTERNAL EXAMINER

## ABSTRACT

Cloud computing is the next phase in the Internet's evolution, providing the means through which computing power, computing infrastructure, applications, business processes can be delivered to businesses and individual as a service wherever and whenever they need. User does not have the time, feasibility or resources to perform the storage correctness verification, at that instance user can optionally delegate this task to an independent monitoring data and making the cloud storage publicly verifiable. The monitoring process is to verify the data between the users. Perception Hanoi monitoring algorithms (PHM) used to monitor the data for security consideration on which one should be used for Cloud based applications and services that require data and then if unauthorized users can access the login to store the unauthorized persons details in data base. Open Key Encryption Algorithm based on Symmetric Algorithms for security consideration on which one should be used for Cloud based applications and services that require data and link encryption. The auditing result not only achieves the fast data error identifying the misbehaving server but also ensures strong cloud storage correctness guarantee.

**OBJECTIVES:****The student should be made to:**

- Understand foundations of Distributed Systems.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand the issues involved in studying process and resource management.

**UNIT I INTRODUCTION**

7

Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges. **Case study:** World Wide Web.

**UNIT II COMMUNICATION IN DISTRIBUTED SYSTEM**

10

System Model – Inter process communication - the API for internet protocols – External data representation and Multicast communication. **Network virtualization:** Overlay networks. **Case study:** MPI **Remote Method Invocation And Objects:** Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. **Case study:** Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: Enterprise Java Beans -from objects to components.

**UNIT III PEER TO PEER SERVICES AND FILE SYSTEM**

10

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. **Overlay case studies:** Pastry, Tapestry- Distributed File Systems -Introduction - **File service architecture** – Andrew File system. **File System:** Features-File model -File accessing models  
- File sharing semantics **Naming:** Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches –LDAP.

**UNIT IV SYNCHRONIZATION AND REPLICATION**

9

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions –Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

**UNIT V PROCESS & RESOURCE MANAGEMENT**

9

**Process Management:** Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. **Resource Management:** Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Discuss trends in Distributed Systems.
- Apply network virtualization.
- Apply remote method invocation and objects.
- Design process and resource management systems.

**TEXT BOOK:**

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.

**REFERENCES:**

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Tanenbaum A.S., Van Steen M., “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.
3. Liu M.L., “Distributed Computing, Principles and Applications”, Pearson Education, 2004.
4. Nancy A Lynch, “Distributed Algorithms”, Morgan Kaufman Publishers, USA, 2003.

  
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**OBJECTIVES:****The student should be made to:**

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and machine learning.

<b>UNIT I</b>	<b>INTRODUCTION TO AI AND PRODUCTION SYSTEMS</b>	<b>9</b>
	Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breadth first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.	
<b>UNIT II</b>	<b>REPRESENTATION OF KNOWLEDGE</b>	<b>9</b>
	Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.	
<b>UNIT III</b>	<b>KNOWLEDGE INFERENCE</b>	<b>9</b>
	Knowledge representation -Production based system, <b>Frame based system.</b> Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.	
<b>UNIT IV</b>	<b>PLANNING AND MACHINE LEARNING</b>	<b>9</b>
	Basic plan generation systems - Strips -Advanced plan generation systems — K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.	
<b>UNIT V</b>	<b>EXPERT SYSTEMS</b>	<b>9</b>
	Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition — Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOOM, Expert systems shells.	

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalise a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

**TEXT BOOKS:**

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008.(Units-I,II,VI & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

**REFERENCES:**

1. Peter Jackson, "Introduction to Expert Systems", 3<sup>rd</sup> Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2<sup>nd</sup> Edition, Pearson Education 2007.
3. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.
4. <http://nptel.ac.in>


  
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**ENHANCEMENT OF CHILDREN SECURITY  
USING RFID**



A PROJECT REPORT

*Submitted by*

<b>ISHWARI.K</b>	621115104015
<b>KOWSALYA.S</b>	621115104026
<b>MOHANA PRIYA.R</b>	621115104036

*in partial fulfillment for the award of the degree  
of*

**BACHELOR OF ENGINEERING**

**In**

**COMPUTER SCIENCE AND ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY: CHENNAI-600 025**

**APRIL 2019**

  
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Certified that this project report "ENHANCEMENT OF CHILDREN SECURITY USING RFID" is the bonafide work of "ESHWARI.K, KOWSALYA.S, MOHANA PRIYA.R" who carried out their project work under my supervision.

  
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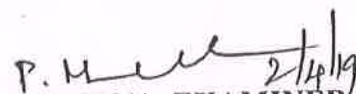
Mrs. M. ABINAYA, M.E.,

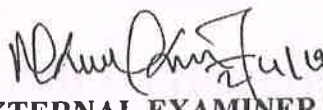
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INTERNAL EXAMINER

  
EXTERNAL EXAMINER

## ABSTRACT

This project discusses the concept of a smart tracking device for little children. The purpose of this device is to help parents locate their children with ease. At the moment there are many wearable's and tracking device in the market which helps to track the daily activity of children and also help to find the child using RTOS and RFID services present on the device. Therefore, the focus of this project is to have an SMS text enabled communication medium between the child's tracking device and the parent as the environment for GSM mobile communication is almost present everywhere. Students who are travelling by bus or any mode of transport can be tracked with time. Alert SMS can also be given by the user when they are in uncomfortable or strange situation. RFID reader will be enabled in the vehicle.

**OBJECTIVES:****The student should be made to:**

- Learn the design principles of a Compiler.
- Learn the various parsing techniques and different levels of translation
- Learn how to optimize and effectively generate machine codes

<b>UNIT I</b>	<b>INTRODUCTION TO COMPILERS</b>	<b>5</b>
	Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics.	
<b>UNIT II</b>	<b>LEXICAL ANALYSIS</b>	<b>9</b>
	Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions- Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.	
<b>UNIT III</b>	<b>SYNTAX ANALYSIS</b>	<b>10</b>
	Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies- Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item- Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .	
<b>UNIT IV</b>	<b>SYNTAX DIRECTED TRANSLATION &amp; RUN TIME ENVIRONMENT</b>	<b>12</b>
	Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker- Equivalence of Type Expressions-Type Conversions.	
	RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation- Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTRAN.	
<b>UNIT V</b>	<b>CODE OPTIMIZATION AND CODE GENERATION</b>	<b>9</b>
	Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis- Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.	

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Design and implement a prototype compiler.
- Apply the various optimization techniques.
- Use the different compiler construction tools.

**TEXTBOOK:**

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers — Principles, Techniques and Tools", 2<sup>nd</sup> Edition, Pearson Education, 2007.

**REFERENCES:**

1. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, "Advanced Compiler Design and Implementation", Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.
4. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.

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**APPLICATION AWARE BIG DATA  
DEDUPLICATION IN CLOUD  
ENVIRONMENT**



**A PROJECT REPORT**

*Submitted by*

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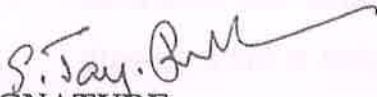
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Certified that this project report “APPLICATION AWARE BIG DATA DEDUPLICATION IN CLOUD ENVIRONMENT” is the bonafide work of “**DHIVYA.S, NIRMALA.E, SONIYA.M**” who carried out their project work under my supervision.



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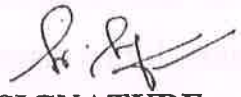
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## ABSTRACT

Deduplication has become a widely deployed technology in cloud data centers to improve IT resources efficiency. However, traditional techniques face a great challenge in big data deduplication to strike a sensible tradeoff between the conflicting goals of scalable deduplication throughput and high duplicate elimination ratio. We propose AppDedupe, an application-aware scalable inline distributed deduplication framework in cloud environment, to meet this challenge by exploiting application awareness, data similarity and locality to optimize distributed deduplication with inter-node two-tiered data routing and intra-node application-aware deduplication. It first dispenses application data at file level with an application-aware routing to keep application locality, then assigns similar application data to the same storage node at the super-chunk granularity using a hand printing-based stateful data routing scheme to maintain high global deduplication efficiency, meanwhile balances the workload across nodes. AppDedupe builds application-aware similarity indices with super-chunk handprints to speed up the intra-node deduplication process with high efficiency. Our experimental evaluation of AppDedupe against state-of-the-art, driven by real-world datasets, demonstrates that AppDedupe achieves the highest global deduplication efficiency with a higher global deduplication effectiveness than the high-overhead and poorly scalable traditional scheme, but at an overhead only slightly higher than that of the scalable but low duplicate-elimination-ratio approaches.



**AN EFFICIENT KEY AGGREGATION**

**AS DATA AS A CONSISTENCY IN**

**CLOUD STORAGE**



**A PROJECT REPORT**

*Submitted by*

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*in partial fulfillment for the award of the degree*

*of*

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**BONAFIDE CERTIFICATE**


Certified that this project report "AN EFFICIENT KEY AGGREGATION AS A SERVICE IN CLOUD STORAGE" is the bonafide work of "K.KAVITHA,R.S.KOWSALYA,M.NITHYA" who carried out the project work under my supervision.

  
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## ABSTRACT

A major problem today for car owners is that they are in constant fear of having their vehicles stolen from a common parking lot or from outside their home. Image processing based real time vehicle theft detection and prevention system provides an ultimate solution for this problem. In this project, a low-cost extendable framework for smart car security system is proposed, which consists of a Face capturing Subsystem, a GPS (Global Positioning System) module, and a control platform. The system described in this paper automatically takes photos of thief when he/she try to stole the vehicle and send to cars owner. The other modules transmit necessary information to users and help to keep eyes on cars all the time, even when the car is lost. This system prototype is built on Raspberry pi, controls all the processes. The GPS module in the car detects the location of the car. So by this system the identification of the thief and the location of the car are simply smarter and cheaper than traditional one.

**OBJECTIVES:****The student should be made to:**

- Understand the basic concepts of mobile computing
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

<b>UNIT I</b>	<b>INTRODUCTION</b>	9
	Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – ReservationBased Schemes.	
<b>UNIT II</b>	<b>MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER</b>	9
	Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.	
<b>UNIT III</b>	<b>MOBILE TELECOMMUNICATION SYSTEM</b>	9
	Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).	
<b>UNIT IV</b>	<b>MOBILE AD-HOC NETWORKS</b>	9
	Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks ( VANET) – MANET Vs VANET – Security.	
<b>UNIT V</b>	<b>MOBILE PLATFORMS AND APPLICATIONS</b>	9
	Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M- Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.	

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Explain the basics of mobile telecommunication system
- Choose the required functionality at each layer for given application
- Identify solution for each functionality at each layer
- Use simulator tools and design Ad hoc networks
- Develop a mobile application.

**TEXT BOOK:**

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt.Ltd, New Delhi – 2012.

**REFERENCES:**

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4. William.C.Y.Lee, "Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition, Tata Mc Graw Hill Edition, 2006.
5. C.K.Toth, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
6. Android Developers : <http://developer.android.com/index.html>
7. Apple Developer : <https://developer.apple.com/>
8. Windows Phone Dev Center : <http://developer.windowsphone.com>
9. BlackBerry Developer : <http://developer.blackberry.com/>

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**OBJECTIVES:****The student should be made to:**

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

**UNIT I INTRODUCTION**

9

Fundamentals of Wireless Communication Technology — The Electromagnetic Spectrum — Radio propagation Mechanisms — Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

**UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS**

9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms — Multi channel MAC-IEEE 802.11

**UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS**

9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- **proactive routing, reactive routing (on-demand)**, hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

**UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS**

9

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures- data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

**UNIT V WSN ROUTING, LOCALIZATION & QOS**

9

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute andrelative localization, triangulation- QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

**TOTAL: 45 PERIODS****OUTCOMES:****Upon completion of the course, the student should be able to:**

- Explain the concepts, network architectures and applications of ad hoc and wireless sensornetworks
- Analyze the protocol design issues of ad hoc and sensor networks
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

**TEXT BOOK:**

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ",Prentice Hall Professional Technical Reference, 2008.

**REFERENCES:**

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks:Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication -2002.
3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks",Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology,Protocols, and Applications", John Wiley, 2007.
5. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

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**OBJECTIVES:****The student should be made to:**

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

**UNIT I INTRODUCTION**

9

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

**UNIT II GRID SERVICES**

9

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

**UNIT III VIRTUALIZATION**

9

**Cloud deployment models:** public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

**UNIT IV PROGRAMMING MODEL**

9

Open source grid middleware packages – Globus Toolkit (GT4) Architecture, Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

**UNIT V SECURITY**

9

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

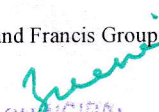
- Apply grid computing techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

**TEXT BOOK:**

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, “Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet”, First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

**REFERENCES:**

1. Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009
2. Tom White, “Hadoop The Definitive Guide”, First Edition. O’Reilly, 2009.
3. Bart Jacob (Editor), “Introduction to Grid Computing”, IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, “The Grid: Blueprint for a New Computing Infrastructure”, 2<sup>nd</sup> Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, “Introduction to Grid Computing” CRC Press, 2009.
6. Daniel Minoli, “A Networking Approach to Grid Computing”, John Wiley Publication, 2005.
7. Barry Wilkinson, “Grid Computing: Techniques and Applications”, Chapman and Hall, CRC, Taylor and Francis Group, 2010.

  
 PRINCIPAL  
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**OBJECTIVES:****The student should be made to:**

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system.
- Learn the system design techniques and networks for embedded systems

**UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9**

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps — Co-processors- Memory system mechanisms — CPU performance- CPU power consumption.

**UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9**

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

**UNIT III PROCESSES AND OPERATING SYSTEMS 9**

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – **Evaluating operating system performance**- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE.

**UNIT V SYSTEM DESIGN TECHNIQUES AND NETWORKS 9**

Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors.

**UNIT V CASE STUDY 9**

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine-Engine control unit – Video accelerator.

**TOTAL: 45 PERIODS****OUTCOMES:****Upon completion of the course, students will be able to:**

- Describe the architecture and programming of ARM processor.
- Outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.
- Use the system design techniques to develop software for embedded systems
- Differentiate between the general purpose operating system and the real time operating system
- Model real-time applications using embedded-system concepts

**TEXT BOOK:**

1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

**REFERENCES:**

1. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.
2. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
3. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
4. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997
5. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", DreamTech Press, 2005.
6. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.

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**OBJECTIVES:****The student should be made to:**

- Learn the foundations of Human Computer Interaction.
- Be familiar with the design technologies for individuals and persons with disabilities.
- Be aware of mobile HCI.
- Learn the guidelines for user interface.

**UNIT I FOUNDATIONS OF HCI 9**

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

**UNIT II DESIGN & SOFTWARE PROCESS 9**

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

**UNIT III MODELS AND THEORIES 9**

Cognitive models – Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

**UNIT IV MOBILE HCI 9**

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

**UNIT V WEB INTERFACE DESIGN 9**

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

**L: 45, T: 0, TOTAL: 45 PERIODS**

**OUTCOMES:****Upon completion of the course, the student should be able to:**

- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.

**TEXT BOOKS:**

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3<sup>rd</sup> Edition, Pearson Education, 2004 (UNIT I, II & III).
2. Brian Fling, "Mobile Design and Development", First Edition, O'Reilly Media Inc., 2009 (UNIT –IV).

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**ANTI-THEFT DETECTION AND  
TRACKING WITH FACE CAPTURING  
SYSTEM USING RASPBERRY PI**



**A PROJECT REPORT**

*Submitted by*

**ABINAYA P.S**

621115104001

**BABYSUBBULAKSHMI P**

621115104010

**MELVIN A**

621115104034

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*of*

**BACHELOR OF ENGINEERING**

*in*

**COMPUTER SCIENCE AND ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY :: CHENNAI-600 025**

**APRIL 2019**

*R. Gurumani*  
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**ANNA UNIVERSITY : CHENNAI-600 025**

**BONAFIDE CERTIFICATE**

Certified that this project report "ANTI-THEFT DETECTION AND TRACKING WITH FACE CAPTURING SYSTEM USING RASPBERRY PI" is the bonafide work of "ABINAYA P.S, BABYSUBBULAKSHMI P, MELVIN A" who carried out the project work under my supervision.

  
SIGNATURE

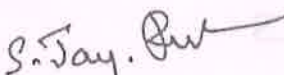
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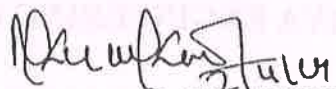
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INTERNAL EXAMINER

  
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## ABSTRACT

A major problem today for car owners is that they are in constant fear of having their vehicles stolen from a common parking lot or from outside their home. Image processing based real time vehicle theft detection and prevention system provides an ultimate solution for this problem. In this project, a low-cost extendable framework for smart car security system is proposed, which consists of a Face capturing Subsystem, a GPS (Global Positioning System) module, and a control platform. The system described in this paper automatically takes photos of thief when he/she try to stole the vehicle and send to cars owner. The other modules transmit necessary information to users and help to keep eyes on cars all the time, even when the car is lost. This system prototype is built on Raspberry pi, controls all the processes. The GPS module in the car detects the location of the car. So by this system the identification of the thief and the location of the car are simply smarter and cheaper than traditional one.



**ON CRITICAL SERVICE RECOVAERY  
AFTER MASSIVE NETWORK  
FAILURES**



**A PROJECT REPORT**

*Submitted by*

**KARPAGAVALLN**

**621115104021**

**MAHALAKSHMI.R**

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**ROOBINI.V**

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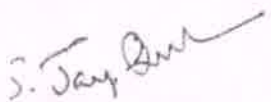
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BONAFIDE CERTIFICATE

Certified that this project report on "ON CRITICAL SERVICE RECOVERY AFTER MASSIVE NETWORK FAILURES" is the bonafide work of "N.KARPAGAVALLI, R.MAHALAKSHMI, V.ROOBINI" who carried out the project work under my supervision.

  
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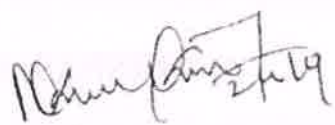
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INTERNAL EXAMINER

  
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## ABSTRACT

This project addresses the problem of efficiently restoring sufficient resources in a communications network to support the demand of mission critical services after a large-scale disruption. We give a formulation of the problem as a mixed integer linear programming and show that it is NP-hard. We propose a polynomial time heuristic, called iterative split and prune (ISP) that decomposes the original problem recursively into smaller problems, until it determines the set of network components to be restored. ISP's decisions are guided by the use of a new notion of demand-based centrality of nodes. We performed extensive simulations by varying the topologies, the demand intensity, the number of critical services, and the disruption model. Compared with several greedy approaches, ISP performs better in terms of total cost of repaired components, and does not result in any demand loss. It performs very close to the optimal when the demand is low with respect to the supply network capacities, thanks to the ability of the algorithm to maximize sharing of repaired resources.



## **COLLEGE WEBSITE DEVELOPMENT**



### **A PROJECT REPORT**

**Submitted by**

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**R.RESHMA**

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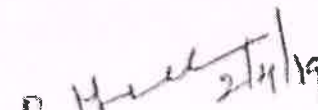
Certified that this project report "COLLEGE WEBSITE DEVELOPMENT" is the bonafide work of "A.LICIYA ANGEL, R.RESHMA, SHABANA" who carried out the project under my supervision.

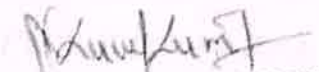
  
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**OBJECTIVES:****The student should be made to:**

- Be familiar with the structure of basic electronic devices.
- Be exposed to the operation and applications of electronic devices.

**UNIT I PN JUNCTION DEVICES**

9

PN junction diode –structure, operation and V-I characteristics, diffusion and transient capacitance -Rectifiers — Half Wave and Full Wave Rectifier,— Display devices- LED, Laser diodes- Zener diode- characteristics-Zener Reverse characteristics – Zener as regulator

**UNIT II TRANSISTORS**

9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristor and IGBT - Structure and characteristics.

**UNIT III AMPLIFIERS**

9

BJT small signal model — Analysis of CE, CB, CC amplifiers- Gain and frequency response — MOSFET small signal model— Analysis of CS and Source follower – Gain and frequency response-High frequency analysis.

**UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER**

9

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

**UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS**

9

Advantages of negative feedback – voltage / current, series , Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

**TOTAL (L:45+T:15): 60 PERIODS****OUTCOMES:**


- To explain the structure of the basic electronic devices.
- To design applications using the basic electronic devices.

**TEXT BOOKS:**

1. David A. Bell, [Electronic Devices and Circuits], Prentice Hall of India, 2004.
2. Sedra and Smith, —Microelectronic Circuits — Oxford University Press, 2004.

**REFERENCES:**

1. Rashid, —Micro Electronic Circuits Thomson publications, 1999.
2. Floyd, —Electron Devices Pearson Asia 5th Edition, 2001.
3. Donald A Neamen, —Electronic Circuit Analysis and Design Tata McGraw Hill, 3<sup>rd</sup> Edition, 2003.
4. Robert L. Boylestad, —Electronic Devices and Circuit theory, 2002.
5. Robert B. Northrop, —Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation, CRC Press, 2004.


  
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**LCL FILTERED QUASI-Z SOURCE**

**GRID-TIED-INVERTERS**



**A PROJECT REPORT**

*Submitted by*

**ANBARASI.P**

621115105002

**PRADEEPA.P**

621115105013

**SELVALAKSHMI**

621115105020

*in partial fulfillment for the award of the degree*

*of*

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*in*

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**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

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**APRIL 2019**

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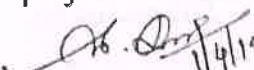
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**BONAFIDE CERTIFICATE**

Certified that this project report "LCL FILTERED QUASI-Z-SOURCE GRID-TIED INVERTERS" is the bonafide work of "P.ANBARASI, P.PRADEEPA,

T.SELVALAKSHMI" who carried out the project work under my supervision.

  
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Mrs.A.YOGARANI.,M.E.,

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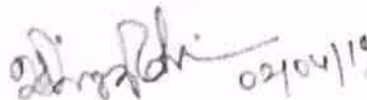
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VILLUPURAM (DT),

VILLUPURAM (DT),

Submitted for the University Examination Held on 02/4/19.FN

  
INTERNAL EXAMINER

  
EXTERNAL EXAMINER

  
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CHINNASALEM-606 201. KALLAKURICHI DT.

## ABSTRACT

This project a fixed frequency sliding mode control methodology for single-phase grid-tied LCL filtered quasi z-source inverters quasi. In the presented methodology, a smoothing process is applied to the sliding surface function so as to eliminate the chattering and achieve the fixed switching frequency. The smoothing process is conducted by passing the sliding surface function through a narrow boundary layer. To alleviate the steady state error arising due to the smoothing process, a PR controller is employed to process the grid current error and determine the capacitor voltage reference needed in the SMC. The shoot through control of the quasi is achieved by using the simple boost control technique.

**OBJECTIVES:**

- To develop expressions for the computation of transmission line parameters.
- To obtain the equivalent circuits for the transmission lines based on distance and operating voltage for determining voltage regulation and efficiency. Also to improve the voltage profile of the transmission system.
- To analyse the voltage distribution in insulator strings and cables and methods to improve the same.
- To understand the operation of the different distribution schemes.

**UNIT I STRUCTURE OF POWER SYSTEM 9**

Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors – distributed and concentrated loads – interconnection – EHVAC and HVDC transmission -Introduction to FACTS.

**UNIT II TRANSMISSION LINE PARAMETERS 9**

Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of solid, stranded and bundled conductors, **Symmetrical and unsymmetrical spacing and transposition** - application of self and mutual GMD; skin and proximity effects - interference with neighboring communication circuits - Typical configurations, conductor types and electrical parameters of EHV lines, corona discharges.

**UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9**

Classification of lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation, real and reactive power flow in lines, Power - circle diagrams, surge impedance loading, methods of voltage control; Ferranti effect.

**UNIT IV INSULATORS AND CABLES 9**

Insulators - Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators. Underground cables - Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables.

**UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING 9**

Mechanical design of transmission line – sag and tension calculations for different weather conditions, Tower spotting, Types of towers, Substation Layout (AIS, GIS), Methods of grounding.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. D.P.Kothari , I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
2. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

**REFERENCES:**

1. B.R.Gupta , S.Chand, 'Power System Analysis and Design' New Delhi, Fifth Edition, 2008.
2. Luces MFualken berry ,Walter Coffe, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. Hadi Saadat, 'Power System Analysis', PSA Publishing; Third Edition, 2010.
4. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.
5. G.Ramamurthy, —Handbook of Electrical power Distribution, Universities Press, 2013.

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**GSM BASED AUTOMATIC  
RAILWAY GATE CONTROL**



**WITH LCD DISPLAY MONITORING SYSTEM**

A PROJECT REPORT

*Submitted by*

**ANITHA.J**

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**ANJUS**

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**RAMYA.P**

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*In partial fulfilment for the award of the degree*

*of*

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**APRIL 2019**

  
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**CHINNASALEM-606 201, KALLAKURICHI DT.**

ANNA UNIVERSITY : CHENNAI 600 025

**BONAFIDE CERTIFICATE**

Certified that this project report "GSM BASED AUTOMATIC RAILWAY GATE CONTROL WITH LCD DISPLAY MONITORING SYSTEM" is the bonafide work of "LANITHA, S.ANJU, P.RAMYA" who carried out the project work under my supervision.



SIGNATURE



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Ms.M.BENITTAMARY.,M.E.,

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SUPERVISOR

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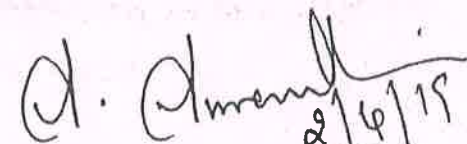
Chinnasalem-606 201.

Chinnasalem-606 201.

Submitted for the university examination held on 08.04.19.FN

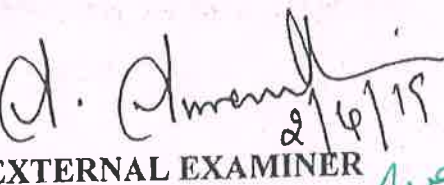


INTERNAL EXAMINER



EXTERNAL EXAMINER

ii

  
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## ABSTRACT

Various systems have been developed for tracking trains at unmanned railway crossings as well as for detection of objects along with automated opening and closing of gates. The Systems which have been proposed till now; may efficiently close and opens the gates at the arrival and departure of trains to avoid any accident at the crossing. But, there are so many accidents occurred while crossing the railway tracks, due to the sudden arrival of train. One of the major reasons of accidents at railway track is people indulging with their head phones. After the survey of various papers, there is no any system which has been proposed to avoid these incidents. The objective of this paper is to review all existing systems based on real time accident prevention using various techniques. Using Vibration Sensor and IR sensor the control unit is designed also its to alert through message.

**OBJECTIVES:**

- To impart knowledge on Construction and performance of salient and non — salient types synchronous generators.
- To impart knowledge on Principle of operation and performance of synchronous motor.
- To impart knowledge on Construction, principle of operation and performance of induction machines.
- To impart knowledge on Starting and speed control of three-phase induction motors.
- To impart knowledge on Construction, principle of operation and performance of single phase induction motors and special machines.

**UNIT I SYNCHRONOUS GENERATOR**

9

Constructional details – Types of rotors – winding factors – emf equation – Synchronous reactance – Armature reaction – Phasor diagrams of non salient pole synchronous generator connected to infinite bus – Synchronizing and parallel operation – Synchronizing torque – Change of excitation and

mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A methods – steady state power- angle characteristics – Two reaction theory – slip test – short circuit transients – Capability Curves

**UNIT II SYNCHRONOUS MOTOR**

9

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed – Hunting – natural frequency of oscillations – damper windings – synchronous condenser.

**UNIT III THREE PHASE INDUCTION MOTOR**

9

Constructional details – Types of rotors – Principle of operation – Slip – cogging and crawling – Equivalent circuit – Torque-Slip characteristics – Condition for maximum torque – Losses and efficiency – Load test – No load and blocked rotor tests – Circle diagram – Separation of losses – Double cage induction motors – Induction generators – Synchronous induction motor.

**UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR**

9

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star-delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded connection – V/f control – Slip power recovery scheme – Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

**UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES**

9

Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors – Capacitor-start capacitor run Induction motor – Shaded pole induction motor – Linear induction motor – Repulsion motor – Hysteresis motor – AC series motor – Servo motors – Stepper motors – introduction to magnetic levitation systems.

**TOTAL (L:45+T:15): 60 PERIODS****OUTCOMES:**

- Ability to model and analyze electrical apparatus and their application to power system

**TEXT BOOKS:**

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Tata Mc Graw Hill publishing Company Ltd, 2003.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.
3. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

**REFERENCES:**

1. M.N. Bandyopadhyay, 'Electrical Machines Theory and Practice', PHI Learning PVT LTD., New Delhi, 2009.
2. Charles A. Gross, 'Electric Machines', CRC Press, 2010.
3. K. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, 2002.
4. Syed A. Nasar, 'Electric Machines and Power Systems: Volume I', McGraw-Hill College; International ed Edition, January 1995.
5. Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', Tata McGraw Hill Publications, 2001.

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**RENEWABLE INTEGRATED 3-STAGE**

**MMC FOR HIGH AND LOW POWER**

**APPLICATIONS**



**A PROJECT REPORT**

*Submitted by*

**DEEPIKA.B**

621115105006

**PRIYADHARSHINI.M**

621115105014

**FARZANA.B**

621115105701

*In partial fulfilment for the award of the degree*

*Of*

**BACHELOR OF ENGINEERING**

*In*

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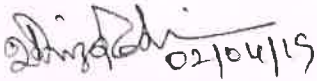
**APRIL 2019**

*R. Gurumani*  
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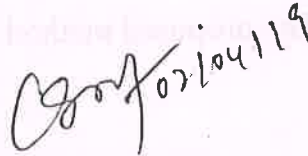
**BONAFIDE CERTIFICATE**

Certified that this project report "RENEWABLE INTEGRATED 3-STAGE MMC FOR HIGH AND LOW POWER APPLICATIONS" is the bonafide work of "DEEPIKA.B, PRIYADHARSHINI.M, FARZANA.B" who carried out the project work under my supervision.

  
02/04/19

SIGNATURE

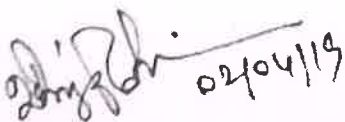
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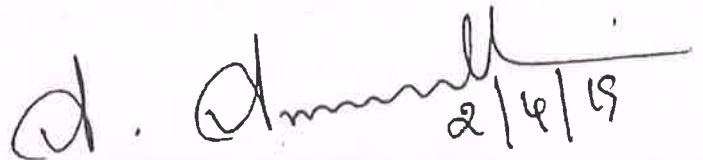
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INTERNAL EXAMINER

  
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EXTERNAL EXAMINER

  
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## ABSTRACT

The aim of this project is currentless sorting and selection (SAS) based capacitor–voltage–balancing method for modular multilevel converters (MMCs). Without the knowledge of arm–current signals, this method has almost the same performance as the conventional SAS method while reducing the sampling signals, compacting the control system and saving the overall cost. The derivative of the total capacitor voltage of an arm, instead of the arm current, is employed to determine which sub-modules (SMs) should be inserted or bypassed. The proposed method is verified by experimental results.

**OBJECTIVES:**

- To get an overview of different types of power semiconductor devices and their switching characteristics.
- To understand the operation, characteristics and performance parameters of controlled rectifiers.
- To study the operation, switching techniques and basic topologies of DC-DC switching regulators.
- To learn the different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
- To study the operation of AC voltage controller and various configurations.

**UNIT I POWER SEMI-CONDUCTOR DEVICES 9**

Study of switching devices, Diode, SCR, TRIAC, GTO, BJT, MOSFET, IGBT-Static and Dynamic characteristics - Triggering and commutation circuit for SCR- Design of Driver and snubber circuit.

**UNIT II PHASE-CONTROLLED CONVERTERS 9**

2-pulse, 3-pulse and 6-pulse converters – performance parameters – Effect of source inductance – Gate Circuit Schemes for Phase Control – Dual converters.

**UNIT III DC TO DC CONVERTER 9**

Step-down and step-up chopper-control strategy – Forced commutated chopper – Voltage commutated, Current commutated, Load commutated, Switched mode regulators - Buck, boost, **buck-boost converter, Introduction to Resonant Converters.**

**UNIT IV INVERTERS 9**

**Single phase and three phase voltage source inverters (both  $120^\circ$  mode and  $180^\circ$  mode)** – Voltage & harmonic control – PWM techniques: Sinusoidal PWM, modified sinusoidal PWM - multiple PWM – Introduction to space vector modulation – Current source inverter.

**UNIT V AC TO AC CONVERTERS 9**

**Single phase and Three phase AC voltage controllers** – Control strategy - Power Factor Control – Multistage sequence control - single phase and three phase cyclo converters – Introduction to Matrix converters.

**TOTAL: 45 PERIODS****OUTCOMES:**

- Ability to understand and analyse, linear and digital electronic circuits.

**TEXT BOOKS:**

1. M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, PHI Third Edition, New Delhi, 2004.
2. P.S. Bimbra — Power Electronics | Khanna Publishers, third Edition, 2003.
3. L. Umanand, — Power Electronics Essentials and Applications |, Wiley, 2010.

**REFERENCES:**

1. Joseph Vithayathil, 'Power Electronics, Principles and Applications', McGraw Hill Series, 6<sup>th</sup> Reprint, 2013.
2. Ashfaq Ahmed Power Electronics for Technology Pearson Education, Indian reprint, 2003.
3. Philip T. Krein, — Elements of Power Electronics | Oxford University Press, 2004 Edition.
4. Ned Mohan, Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.
5. Daniel. W. Hart, — Power Electronics |, Indian Edition, Mc Graw Hill, 3<sup>rd</sup> Print, 2013.
6. M.D. Singh and K.B. Khanchandani, — Power Electronics, | Mc Graw Hill India, 2013.

  
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**ADVANCED VOLTAGE SUPPORT  
AND ACTIVE POWER FLOW  
CONTROL IN GRID-CONNECTED  
CONVERTERS UNDER UNBALANCED CONDITIONS**



A PROJECT REPORT

*Submitted by*

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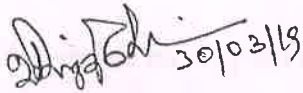
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BONAFIDE CERTIFICATE

Certified that this project report "ADVANCED VOLTAGE SUPPORT AND ACTIVE POWER FLOW CONTROL GRID-CONNECTED CONVERTERS UNDER UNBALANCED CONTIONS" is the bonafide work of "DHANALAKSHMI.K, RASIKA.R, SUDHA.N" who carried out the project work under my supervision.

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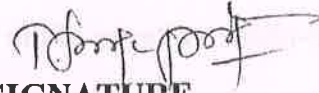
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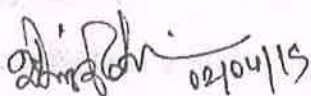
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INTERNAL EXAMINER

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## ABSTRACT

Supporting the grid and improving its reliability have recently become major requirements for large distributed generation units. Under most grid faults, the accuracy of the traditional voltage support schemes (VSSs) is dramatically affected due to the existence of the zero-sequence voltage. Also, the traditional VSSs have been used only in the STATCOM applications, where the active power is zero. This paper proposes an advanced VSS in the converter-interfaced units, called zero-sequence compensated voltage support (ZCVS), to accurately regulate the three-phase voltages of the connection point within the pre-set safety limits. The Proposed scheme not only compensates the zero-sequence component. But also considers the active power injection. Unlike the traditional methods, the proposed VSS is adapted even in resistive distribution systems. The contribution of this paper is, however, ternate. As the second contribution, the limited active power oscillation (LAPO) is proposed to be augmented to the ZCVS. This feature limits the oscillation to a specified value which provides an adjustable dc-link voltage oscillation setting while simultaneously supporting the ac host grid, even under severe unbalanced faults. Third, the maximum active power delivery (MAPD) to the ac grid is also formulated for the ZCVS. The successful results of the opposed support scheme and complementary strategies are verified using selected simulation and experimental test cases.

**OBJECTIVES:**

- To model the power system under steady state operating condition.
- To apply numerical methods to solve the power flow problem.
- To model and analyze the system under faulted conditions.
- To model and analyze the transient behaviour of power system when it is subjected to a fault.

**UNIT I INTRODUCTION**

9

Need for system planning and operational studies – basic components of a power system.-Introduction to restructuring - Single line diagram – per phase and per unit analysis – Generator - transformer – transmission line and load representation for different power system studies.- Primitive network - construction of Y-bus using inspection and singular transformation methods – z-bus.

**UNIT II POWER FLOW ANALYSIS**

9

Importance of power flow analysis in planning and operation of power systems - statement of power flow problem - classification of buses - development of power flow model in complex variables form - iterative solution using Gauss-Seidel method - Q-limit check for voltage controlled buses – power flow model in polar form - iterative solution using Newton-Raphson method .

**UNIT III FAULT ANALYSIS – BALANCED FAULTS**

9

Importance of short circuit analysis - assumptions in fault analysis - analysis using Thevenin's theorem - Z-bus building algorithm - fault analysis using Z-bus – computations of short circuit capacity, post fault voltage and currents.

**UNIT IV FAULT ANALYSIS – UNBALANCED FAULTS**

9

Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines - sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus matrix.

**UNIT V STABILITY ANALYSIS**

9

Importance of stability analysis in power system planning and operation - classification of power system stability - angle and voltage stability – Single Machine Infinite Bus (SMIB) system; Development of swing equation - equal area criterion - determination of critical clearing angle and time– solution of swing equation by modified Euler method and Runge-Kutta fourth order method.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. Nagrath L.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. John J. Grainger and W.D. Stevenson Jr., 'Power System Analysis', Tata McGraw-Hill, Sixth reprint, 2010.
3. P. Venkatesh, B.V. Manikandan, S. Charles Raja, A. Srinivasan, 'Electrical Power Systems-Analysis, Security and Deregulation', PHI Learning Private Limited, New Delhi, 2012.

**REFERENCES:**

1. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Pai M.A., 'Computer Techniques in Power System Analysis', Tata McGraw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.
4. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
5. Olle. I Elgerd, 'Electric Energy Systems Theory — An Introduction', Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, 2012.
6. C.A.Gross, 'Power System Analysis', Wiley India, 2011.


  
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**OBJECTIVES:**

- To have an overview of power system operation and control.
- To model power-frequency dynamics and to design power-frequency controller.
- To model reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
- To study the economic operation of power system.
- To teach about SCADA and its application for real time operation and control of power systems.

**UNIT I INTRODUCTION** 9

An overview of power system operation and control - system load variation - load characteristics - load curves and load-duration curve - load factor - diversity factor - Importance of load forecasting and quadratic and exponential curve fitting techniques of forecasting — plant level and system level controls .

**UNIT II REAL POWER - FREQUENCY CONTROL** 9

Basics of speed governing mechanism and modeling - speed-load characteristics — load sharing between two synchronous machines in parallel - control area concept - LFC control of a single-area system - static and dynamic analysis of uncontrolled and controlled cases - two-area system — modeling - static analysis of uncontrolled case - tie line with frequency bias control - state variable model - integration of economic dispatch control with LFC.

**UNIT III REACTIVE POWER-VOLTAGE CONTROL** 9

Generation and absorption of reactive power - basics of reactive power control - excitation systems — modeling - static and dynamic analysis - stability compensation - methods of voltage control: tap- changing transformer, SVC (TCR + TSC) and STATCOM – secondary voltage control.

**UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH** 9

Formulation of economic dispatch problem — I/O cost characterization — incremental cost curve - co- ordination equations without and with loss (No derivation of loss coefficients) - solution by direct method and  $\lambda$ -iteration method - statement of unit commitment problem — priority-list method - forward dynamic programming.

**UNIT V COMPUTER CONTROL OF POWER SYSTEMS** 9

Need for computer control of power systems - concept of energy control centre - functions - system monitoring - data acquisition and control - system hardware configuration — SCADA and EMS functions - network topology - state estimation — WLSE - Contingency Analysis - state transition diagram showing various state transitions and control strategies.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. Olle.Elgerd, 'Electric Energy Systems theory - An introduction', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.
2. Allen. J. Wood and Bruce F. Wollenberg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 2003.
3. Abhijit Chakrabarti, Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

**REFERENCES:**

1. Nagrath I.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
4. N.V.Ramana, —Power System Operation and Control, Pearson, 2011.
5. C.A.Gross, —Power System Analysis, Wiley India, 2011.

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**OBJECTIVES:**

- To introduce the Building Blocks of Embedded System
- To Educate in Various Embedded Development Strategies
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in Various processor scheduling algorithms.
- To introduce Basics of Real time operating system and example tutorials to discuss on one real-time operating system tool

**UNIT I INTRODUCTION TO EMBEDDED SYSTEMS**

9

Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

**UNIT II EMBEDDED NETWORKING**

9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols - RS232 standard – RS422 – RS485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I<sup>2</sup>C) –need for device drivers.

**UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT**

9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.

**UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN**

9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication- shared memory, message passing-, Inter process Communication — synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, µC/OS-II, RT Linux.

**UNIT V EMBEDDED SYSTEM APPLICATION DEVELOPMENT**

9

Case Study of Washing Machine- Automotive Application- Smart card System Application..

**TOTAL: 45 PERIODS****OUTCOMES:**

- Ability to understand and analyse, linear and digital electronic circuits.

**TEXT BOOKS:**

1. Rajkamal, Embedded System-Architecture, Programming, Design, Mc Graw Hill, 2013.
2. Peckol, —Embedded system Design, John Wiley & Sons, 2010
3. Lyla B Das, Embedded Systems-An Integrated Approach, Pearson, 2013

**REFERENCES:**

1. Shibu. K.V, —Introduction to Embedded Systems, Tata Mcgraw Hill, 2009.
2. Elicia White, Making Embedded Systems, O' Reilly Series, SPD, 2011.
3. Tammy Noergaard, —Embedded Systems Architecture, Elsevier, 2006.
4. Han-Way Huang, Embedded system Design Using C8051F, Cengage Learning, 2009.
5. Rajib Mall —Real-Time systems Theory and Practice, Pearson Education, 2007.

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**DUAL INPUT DC-DC BUCKBOOST  
CONVERTOR USING H-BRIDGE CELLS**

**A PROJECT REPORT**



*Submitted*

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<b>KOWSALYA.V</b>	621115105010
<b>REKA.R</b>	621113105017
<b>SATHYA.V</b>	621113105018

*in partial fulfilment for the award of the degree*

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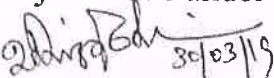
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BONAFIDE CERTIFICATE

Certified that this project report "DUAL INPUT DC-DC BUCKBOOST CONVERTER USING H-BRIDGE CELLS" is the bonafide work of "M.ABIRAMI, V.KOWSALYA, R.REKA, V.SATHYA" who carried out the project work under my supervision.

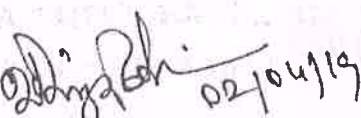
  
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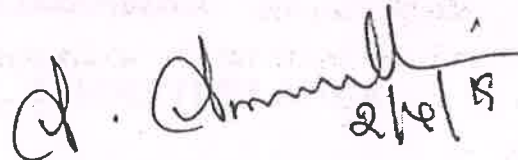
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02/04/19  
INTERNAL EXAMINER

  
2/4/19  
EXTERNAL EXAMINER

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## ABSTRACT

With the advancement in renewable energy technology, multi-input converters play a vital role. These converters have to be energy efficient to improve the power mismatch between the source and load power. Hence, the number of active switches in the circuit are to be minimized. In this project, a double input dc-dc converter system using H-bridge cell is derived by utilizing power electronic switches like MOSFET, diodes. The topology is simulated for different operating modes and voltage transfer ratios are verified. The converter has only one inductor so that the numbers of passive components are also reduced in the system. The operating characteristic of the converter is verified through the simulation and hardware outputs. Out of the two topologies, the latter topology is an improved version of the former one. Both converters have the capability to simultaneously deliver power to the load from the input energy sources. The major advantages of the improved converter as compared with the basic topology are its capability to perform the buck, boost, and buck-boost modes of operation using the same structure and the ability to deliver power to the load even with the failure of any one of the input energy sources. Hence, the detailed software simulation of the improved converter has been performed using MATLAB/Simulink platform.

**OBJECTIVES:**

- To educate the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- To introduce the characteristics and functions of relays and protection schemes.
- To impart knowledge on apparatus protection
- To introduce static and numerical relays
- To impart knowledge on functioning of circuit breakers

**UNIT I PROTECTION SCHEMES**

9

Principles and need for protective schemes – nature and causes of faults – types of faults – fault current calculation using symmetrical components – Methods of Neutral grounding – Zones of protection and essential qualities of protection – Protection schemes

**UNIT II ELECTROMAGNETIC RELAYS**

9

Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Overcurrent, Directional, Distance, Differential, Negative sequence and Under frequency relays.

**UNIT III APPARATUS PROTECTION**

9

Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, busbars and transmission line.

**UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION**

9

Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators – Block diagram of Numerical relays – Overcurrent protection, transformer differential protection, distant protection of transmission lines.

**UNIT V CIRCUIT BREAKERS**

9

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping - interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF<sub>6</sub> and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. Sunil S.Rao, 'Switchgear and Protection', Khanna Publishers, New Delhi, 2008.
2. B.Rabindranath and N.Chander, 'Power System Protection and Switchgear', New Age International (P) Ltd., First Edition 2011.
3. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, 'A Text Book on Power System Engineering', Dhanpat Rai & Co., 1998.

**REFERENCES:**

1. Badri Ram ,B.H. Vishwakarma, 'Power System Protection and Switchgear', New Age International Pvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, 'Fundamentals of power system protection', Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, 'Electrical Power Systems', 6th Edition, New Age International (P) Ltd., 2010
4. Ravindra P.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., New Delhi, 2009.
5. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani, 'Protection and Switchgear' Oxford University Press, 2011.

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**OBJECTIVES:**

- To introduce the power quality problem
- To educate on production of voltages sags, over voltages and harmonics and methods of control.
- To study overvoltage problems
- To study the sources and effect of harmonics in power system
- To impart knowledge on various methods of power quality monitoring.

**UNIT I INTRODUCTION TO POWER QUALITY**

9

**Terms and definitions:** Overloading - under voltage - over voltage. Concepts of transients - short duration variations such as interruption - long duration variation such as sustained interruption. Sags and swells - voltage sag - voltage swell - voltage imbalance - voltage fluctuation - power frequency variations. International standards of power quality. Computer Business Equipment Manufacturers Associations (CBEMA) curve.

**UNIT II VOLTAGE SAGS AND INTERRUPTIONS**

9

Sources of sags and interruptions - estimating voltage sag performance. Thevenin's equivalent source - analysis and calculation of various faulted condition. Voltage sag due to induction motor starting. Estimation of the sag severity - mitigation of voltage sags, active series compensators. Static transfer switches and fast transfer switches.

**UNIT III OVERVOLTAGES**

9

Sources of over voltages - Capacitor switching — lightning - ferro resonance. Mitigation of voltage swells - surge arresters - low pass filters - power conditioners. Lightning protection — **shielding - line arresters** - protection of transformers and cables. An introduction to computer analysis tools for transients, PSCAD and EMTF.

**UNIT IV HARMONICS**

9

**Harmonic sources from commercial and industrial loads, locating harmonic sources.** Power system response characteristics - Harmonics Vs transients. Effect of harmonics - harmonic distortion - voltage and current distortion - harmonic indices - inter harmonics — resonance. Harmonic distortion evaluation - devices for controlling harmonic distortion - passive and active filters. IEEE and IEC standards.

**UNIT V POWER QUALITY MONITORING**

9

Monitoring considerations - monitoring and diagnostic techniques for various power quality problems - modeling of power quality (harmonics and voltage sag) problems by mathematical simulation tools - power line disturbance analyzer — quality measurement equipment - harmonic / spectrum analyzer - flicker meters - disturbance analyzer. Applications of expert systems for power quality monitoring.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. Roger. C. Dugan, Mark. F. McGranagh, Surya Santoso, H.Wayne Beaty, 'Electrical Power Systems Quality' McGraw Hill, 2003. (For Chapters 1, 2, 3, 4 and 5).
2. Eswald.F.Fudis and M.A.S.Masoum, "Power Quality in Power System and Electrical Machines," Elsevier Academic Press, 2013.
3. J. Arrillaga, N.R. Watson, S. Chen, 'Power System Quality Assessment', Wiley, 2011.

**REFERENCES:**

1. G.T. Heydt, 'Electric Power Quality', 2<sup>nd</sup> Edition. (West Lafayette, IN, Stars in a Circle Publications, 1994). (For Chapter 1, 2, 3 and 5)
2. M.H.J Bollen, 'Understanding Power Quality Problems: Voltage Sags and Interruptions', (New York: IEEE Press, 1999). (For Chapters 1, 2, 3 and 5)
3. G.J.Wakileh, —Power Systems Harmonics — Fundamentals, Analysis and Filter Design, I Springer 2007.
4. E.Acha and M.Madrigal, —Power System Harmonics, Computer Modelling and Analysis, — Wiley India, 2012.
5. R.S.Vedam, M.S.Sarma, —Power Quality — VAR Compensation in Power Systems, I CRC Press 2013.
6. C. Sankaran, 'Power Quality', CRC press, Taylor & Francis group, 2002.

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**OBJECTIVES:**

- To analyze the various concepts behind renewable energy resources.
- To introduce the energy saving concept by different ways of illumination.
- To understand the different methods of electric heating and electric welding.
- To introduce knowledge on Solar Radiation and Solar Energy Collectors
- To introduce concepts of Wind Energy and its utilization

**UNIT I ELECTRIC DRIVES AND TRACTION**

9

Fundamentals of electric drive - choice of an electric motor - application of motors for particular services - traction motors - characteristic features of traction motor - systems of railway electrification - electric braking - train movement and energy consumption - traction motor control - track equipment and collection gear.

**UNIT II ILLUMINATION**

9

Introduction - definition and meaning of terms used in illumination engineering - classification of light sources - incandescent lamps, sodium vapour lamps, mercury vapour lamps, fluorescent lamps — design of illumination systems - indoor lighting schemes - factory lighting halls - outdoor lighting schemes - flood lighting - street lighting - energy saving lamps, LED.

**UNIT III HEATING AND WELDING**

9

Introduction - advantages of electric heating — modes of heat transfer - methods of electric heating - resistance heating - arc furnaces - induction heating - dielectric heating - electric welding — types - resistance welding - arc welding - power supply for arc welding - radiation welding.

**UNIT IV SOLAR RADIATION AND SOLAR ENERGY COLLECTORS**

9

Introduction - solar constant - solar radiation at the Earth's surface - solar radiation geometry — estimation of average solar radiation - physical principles of the conversion of solar radiation into heat — flat-plate collectors - transmissivity of cover system - energy balance equation and collector efficiency - concentrating collector - advantages and disadvantages of concentrating collectors - performance analysis of a cylindrical - parabolic concentrating collector — Feedin Invertors.

**UNIT V WIND ENERGY**

9

Introduction - basic principles of wind energy conversion - site selection considerations - basic components of a WECS (Wind Energy Conversion System) - Classification of WECS - types of wind Turbines - analysis of aerodynamic forces acting on the blade - performances of wind.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.
- Ability to handle the engineering aspects of electrical energy generation and utilization.

**TEXT BOOKS:**

1. N.V. Suryanarayana, —Utilisation of Electric Power, Wiley Eastern Limited, New Age International Limited, 1993.
2. J.B.Gupta, —Utilisation Electric power and Electric Traction, S.K.Kataria and Sons, 2000.
3. G.D.Rai, —Non-Conventional Energy Sources, Khanna Publications Ltd., New Delhi, 1997.

**REFERENCES:**

1. R.K.Rajput, Utilisation of Electric Power, Laxmi publications Private Limited., 2007.
2. H.Partab, Art and Science of Utilisation of Electrical Energy, Dhanpat Rai and Co., New Delhi, 2004.
3. C.L.Wadhwa, —Generation, Distribution and Utilisation of Electrical Energy, New Age International Pvt.Ltd., 2003.
4. S. Sivanagaraju, M. Balasubba Reddy, D. Srilatha, ' Generation and Utilization of Electrical Energy', Pearson Education, 2010.
5. Donald L. Steeby, ' Alternative Energy Sources and Systems', Cengage Learning, 2012.

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**SSR MITIGATION WITH  
A NEW CONTROL OF  
PV SOLAR FARM AS STATCOM  
(PV-STATCOM)**



A PROJECT REPORT

*Submitted by*

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**NITHIYA.C**

621115105011

**MONIKA.G**

621115105702

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*


**ELECTRICAL AND ELECTRONICS ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY::CHENNAI-600 025**

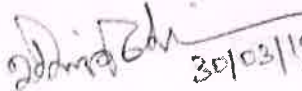
**APRIL 2019**

  
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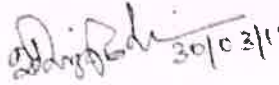
BONAFIDE CERTIFICATE

Certified that this project report "SSR MITIGATION WITH A NEW CONTROL OF PV SOLAR FARM AS STATCOM (PV-STATCOM)" is the bonafide work of "ELIZABETH.S, NITHIYA.C, MONIKA.G" who carried out the project work under my supervision.

  
30/03/19

SIGNATURE

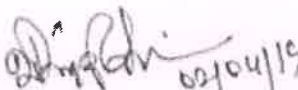
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02/04/19

INTERNAL EXAMINER

  
2/4/19

EXTERNAL EXAMINER

  
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## ABSTRACT

PV solar farm inverter as STATCOM termed PV-STATCOM, for improving stable power transfer limits of the interconnected transmission system. Inverter rating of PV solar farm which remains dormant in the night time is utilized with voltage and damping controls to enhance stable power transmission limits. Control of a large-scale PV solar farm as STATCOM, termed PV-STATCOM, for alleviation of sub synchronous resonance (SSR) in a steam turbine driven synchronous generator connected to a series compensated transmission line. During night time, the PV solar farm can operate as a STATCOM with its entire inverter capacity for SSR mitigation. During daytime, if a system fault triggers SSR, the solar farm autonomously discontinues its normal active power generation and releases its entire inverter capacity to operate as PV-STATCOM for SSR prevention. Once the sub synchronous resonances are damped, the solar farm returns to its normal real power production. This proposed PV-STATCOM technology can either obviate or reduce the need of an expensive flexible ac transmission system device to accomplish the same objective. Furthermore, this technology is more than an order of magnitude cheaper than a conventional static compensators or STATCOM of similar size. The inverter capacity left after real power production is used to accomplish the above objective. Transient stability studies are conducted on a realistic SMIB power system having a midpoint located PV-STATCOM.



**A LLC-LC TYPE BIDIRECTIONAL  
CONTROL STRATEGY FOR LLC  
RESONANT CONVERTER IN POWER**



**ELECTRONICS TRACTION TRANSFORMER**

A PROJECT REPORT

*Submitted by*

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**BONAFIDE CERTIFICATE**

Certified that this project report "A LLC-LC TYPE BIDIRECTIONAL CONTROL STRATEGY FOR LLC RESONANT CONVERTER IN POWER ELECTRONICS TRACTION TRANSFORMER" is the bonafide work of "JAYASURYA.M, PAVITHRA.P, VIDHYA.S" who carried out the project work under my supervision.

 20/03/19

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**Submitted for the University Examination held on 02.04.2019-FN**

 02/04/19

**INTERNAL EXAMINER**

 2/4/19

**EXTERNAL EXAMINER**

  
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## ABSTRACT

A regular LLC resonant half bridge converter works a combination mode of a voltage divider and amplifier of resonant inductor voltage of the resonant tank. At the resonant frequency, impedance of resonant tank is zero, which means the input voltage is some applied on the load. A single-direction configuration of a bidirectional control strategy. A form of DC to DC converter switched-mode power supply. One of a pair of devices that connect to perform the Bridging (networking) function of a computer network. However, the conventional LLC resonant converter is a kind of unidirectional DC/DC converter, and few efficient bidirectional control strategies are suitable for LLC resonant converter to achieve automatic forward-backward transition. Especially, in power electronic traction transformer (PETT). A new design procedure for a bidirectional DC-DC LCL converter for MW range applications, including mobile mining equipment. This type of DC-DC converters employ two DC/AC converters and a passive LCL filter instead of a traditional high frequency transformer. The exclusion of the transformer eliminates the core losses, while the switching losses are minimized by using soft switching operation. DC systems have been known for decades as an effective way of bulk power delivery.

**OBJECTIVES:**

To impart knowledge on the following Topics

- Construction and performance of salient and non – salient type synchronous generators.
- Principle of operation and performance of synchronous motor.
- Construction, principle of operation and performance of induction machines.
- Starting and speed control of three-phase induction motors.
- Construction, principle of operation and performance of single phase induction motors and special machines.

**UNIT I SYNCHRONOUS GENERATOR**

6+6

Constructional details – Types of rotors – winding factors- emf equation – Synchronous reactance – Armature reaction – Phasor diagrams of non salient pole synchronous generator connected to infinite bus–Synchronizing and parallel operation – Synchronizing torque -Change of excitation and mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A methods – steady state power- angle characteristics– Two reaction theory – slip test -short circuit transients - Capability Curves

**UNIT II SYNCHRONOUS MOTOR**

6+6

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed-Hunting – natural frequency of oscillations – damper windings- synchronous condenser.

**UNIT III THREE PHASE INDUCTION MOTOR**

6+6

Constructional details – Types of rotors – Principle of operation – Slip – cogging and crawling- Equivalent circuit – Torque-Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors – Induction generators – Synchronous induction motor.

**UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR**

6+6

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star- delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded connection-V/f control – Slip power recovery scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

**UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES**

6+6

Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors – Capacitor-start capacitor run Induction motor- Shaded pole induction motor - Linear induction motor – Repulsion motor - Hysteresis motor - AC series motor- Servo motors- Stepper motors - introduction to magnetic levitation systems.

**TOTAL : 60 PERIODS****OUTCOMES:**

- Ability to understand the construction and working principle of Synchronous Generator
- Ability to acquire knowledge on Synchronous motor.
- Ability to understand the construction and working principle of Three phase Induction Motor
- Ability to understand the construction and working principle of Special Machines
- Ability to predetermine the performance characteristics of Synchronous Machines.

**TEXT BOOKS:**

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc GrawHill publishing Company Ltd, 2003.
2. Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.
3. Stephen J. Chapman, 'Electric Machinery Fundamentals' 4<sup>th</sup> edition, McGraw Hill Education Pvt. Ltd, 2010.

**REFERENCES**

1. D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 2002.
2. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
3. M.N. Bandyopadhyay, 'Electrical Machines Theory and Practice', PHI Learning PVT LTD., New Delhi, 2009.
4. B.R. Gupta, 'Fundamental of Electric Machines' New age International Publishers, 3<sup>rd</sup> Edition, Reprint 2015.
5. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, 2002.
6. Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', McGraw Hill Publications, 2001.

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**OBJECTIVES:**

- To have an overview of power system operation and control.
- To model power-frequency dynamics and to design power-frequency controller.
- To model reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
- To study the economic operation of power system.
- To teach about SCADA and its application for real time operation and control of power systems.

**UNIT I INTRODUCTION**

9

An overview of power system operation and control - system load variation - load characteristics - load curves and load-duration curve - load factor - diversity factor - Importance of load forecasting and quadratic and exponential curve fitting techniques of forecasting - plant level and system level controls .

**UNIT II REAL POWER - FREQUENCY CONTROL**

9

Basics of speed governing mechanism and modeling - speed-load characteristics — load sharing between two synchronous machines in parallel - control area concept - LFC control of a single-area system - static and dynamic analysis of uncontrolled and controlled cases - two-area system — modeling - static analysis of uncontrolled case - tie line with frequency bias control - state variable model - integration of economic dispatch control with LFC.

**UNIT III REACTIVE POWER-VOLTAGE CONTROL**

9

Generation and absorption of reactive power - basics of reactive power control - excitation systems — modeling - static and dynamic analysis - stability compensation - methods of voltage control: tap- changing transformer, SVC (TCR + TSC) and STATCOM – secondary voltage control.

**UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH**

9

Formulation of economic dispatch problem — I/O cost characterization — incremental cost curve - co- ordination equations without and with loss (No derivation of loss coefficients) - solution by direct method and  $\lambda$ -iteration method - statement of unit commitment problem — priority-list method - forward dynamic programming.

**UNIT V COMPUTER CONTROL OF POWER SYSTEMS**

9

Need for computer control of power systems - concept of energy control centre - functions - system monitoring - data acquisition and control - system hardware configuration — SCADA and EMS functions - network topology - state estimation — WLSE - Contingency Analysis - state transition diagram showing various state transitions and control strategies.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. Olle.I.Elgerd, 'Electric Energy Systems theory - An introduction', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.
2. Allen. J. Wood and Bruce F. Wollenberg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 2003.
3. Abhijit Chakrabarti, Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

**REFERENCES:**

1. Nagrath I.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
4. N.V.Ramana, —Power System Operation and Control, Pearson, 2011.
5. C.A.Gross, —Power System Analysis, Wiley India, 2011.


  
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Govt. Approved TNELB ESB Grade Contractors

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REF: SVE / OFF / IPT / 2018


Date : 14.06.2018

## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. K. ABINAYA**, Reg.No: 621116105001 of IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM, have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

We wish her all success in her future endeavors.

  
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Date : 14.06.2018

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This is to certify that **Ms. M. ARUNA**, Reg.No: 621116105004 of **IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM**, have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

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We wish her all success in her future endeavors.

  
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Govt. Approved TNELB ESB Grade Contractors

VEPPUR CROSS ROAD, CHENNAI – TRICHY MAIN ROAD, CUDDALORE DT – 606 304

REF: SVE / OFF / IPT / 2018

Date : 14.06.2018

## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. K. SHAKINA,** Reg.No: 621116105018 of **IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM,** have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

We wish her all success in her future endeavors.

*Meano*  
**Dr.R.GURUMANI,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.IE.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

*DDJ*  
**SRI VINAYAGA ELECTRICALS**  
**ELECTRICAL ENGINEERS & ELECTRICAL CONTRACTORS**  
TNELB ESB No.2261, Valid upto 13-3-2022  
Prop : K.KRISHNAN B.E.,EEE.,  
C 49393 Valid upto 13-7-2024  
VEPPUR, CUDDALORE DISTRICT-606304.



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Date : 14.06.2018

## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. M. K. SHALINI**, Reg.No: 621116105019 of IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM, have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

We wish her all success in her future endeavors.

*R. Gurumani*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M. ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201, KALLAKURICHI DT.**

*R. Krishna*  
**SRI VINAYAGA ELECTRICALS**  
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## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. K. SRI SWARNA DHARSHINI**, Reg.No: 621116105021 of **IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM**, have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

We wish her all success in her future endeavors.

*Swarni*  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

*[Signature]*  
**SRI VINAYAGA ELECTRICALS**  
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## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. V. SUBASHINI**, Reg.No: 621116105022 of **IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM**, have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

We wish her all success in her future endeavors.

  
**Dr.R.GURUMANI**, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.

  
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Date : 14.06.2018

## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. K. THEERTHANA**, Reg.No: 621116105023 of **IDHAYA ENGINEERING COLLEGE FOR WOMEN, CHINNASALEM**, have successfully completed INTERNSHIP from 03.06.2018 to 12.06.2018 in our premises.

We wish her all success in her future endeavors.

  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
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VEPPUR, CUDDALORE DISTRICT-606304.

**OBJECTIVES:**

- To impart knowledge on Construction and performance of salient and non — salient types synchronous generators.
- To impart knowledge on Principle of operation and performance of synchronous motor.
- To impart knowledge on Construction, principle of operation and performance of induction machines.
- To impart knowledge on Starting and speed control of three-phase induction motors.
- To impart knowledge on Construction, principle of operation and performance of single phase induction motors and special machines.

**UNIT I SYNCHRONOUS GENERATOR**

9

Constructional details – Types of rotors –winding factors- emf equation – Synchronous reactance – Armature reaction – Phasor diagrams of non salient pole synchronous generator connected to infinite bus--Synchronizing and parallel operation – Synchronizing torque -Change of excitation and

mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A methods – steady state power- angle characteristics– Two reaction theory –slip test -short circuit transients - Capability Curves

**UNIT II SYNCHRONOUS MOTOR**

9

Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed- Hunting – natural frequency of oscillations – damper windings- synchronous condenser.

**UNIT III THREE PHASE INDUCTION MOTOR**

9

Constructional details – Types of rotors – Principle of operation – Slip – cogging and crawling- Equivalent circuit – Torque-Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors – Induction generators – Synchronous induction motor.

**UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR**

9

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star-delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded connection-V/f control – Slip power recovery scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

**UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES**

9

Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors – Capacitor-start capacitor run Induction motor- Shaded pole induction motor - Linear induction motor – Repulsion motor - Hysteresis motor - AC series motor- Servo motors- Stepper motors - introduction to magnetic levitation systems.

**TOTAL (L:45+T:15): 60 PERIODS****OUTCOMES:**

- Ability to model and analyze electrical apparatus and their application to power system

**TEXT BOOKS:**

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D.Umans, 'Electric Machinery', Tata Mc Graw Hill publishing Company Ltd, 2003.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.
3. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

**REFERENCES:**

1. M.N.Bandyopadhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2009.
2. Charless A. Gross, —Electric /Machines, —CRC Press, 2010.
3. K. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, 2002.
4. Syed A. Nasar, Electric Machines and Power Systems: Volume I, Mcgraw -Hill College; International ed Edition, January 1995.
5. Alexander S. Langsdorf, Theory of Alternating-Current Machinery, Tata McGraw Hill Publications, 2001.

*Neema*  
PRINCIPAL

Idhaya Engineering College for Women  
Nainarpalaym Road, CHINNASALEM-60624  
Kallakurichi Taluk, Villupuram District

## Certificate of Training Completion

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excellence this certificate has been awarded to*

A. PRECILLA

*For successful completion of In - Plant Training on*

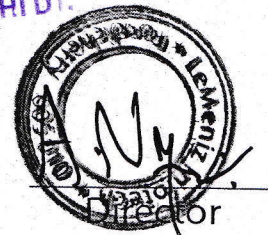
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*From* 6/12/2018 *to* 8/12/2018

*in Le Meniz Infotech, Pondicherry.*

*meini*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201, KALLAKURICHI DT.**

[www.lemenizinfotech.com](http://www.lemenizinfotech.com)



**OBJECTIVES:**

- To model the power system under steady state operating condition.
- To apply numerical methods to solve the power flow problem.
- To model and analyze the system under faulted conditions.
- To model and analyze the transient behaviour of power system when it is subjected to a fault.

**UNIT I INTRODUCTION**

9

Need for system planning and operational studies – basic components of a power system. -Introduction to restructuring - Single line diagram – per phase and per unit analysis – Generator - transformer – transmission line and load representation for different power system studies. - Primitive network - construction of Y-bus using inspection and singular transformation methods – z-bus.

**UNIT II POWER FLOW ANALYSIS**

9

Importance of power flow analysis in planning and operation of power systems - statement of power flow problem - classification of buses - development of power flow model in complex variables form - iterative solution using Gauss-Seidel method - Q-limit check for voltage controlled buses – power flow model in polar form - iterative solution using Newton-Raphson method .

**UNIT III FAULT ANALYSIS – BALANCED FAULTS**

9

Importance of short circuit analysis - assumptions in fault analysis - analysis using Thevenin's theorem - Z-bus building algorithm - fault analysis using Z-bus – computations of short circuit capacity, post fault voltage and currents.

**UNIT IV FAULT ANALYSIS – UNBALANCED FAULTS**

9

Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines - sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus matrix.

**UNIT V STABILITY ANALYSIS**

9

Importance of stability analysis in power system planning and operation - classification of power system stability - angle and voltage stability – Single Machine Infinite Bus (SMIB) system: Development of swing equation - equal area criterion - determination of critical clearing angle and time– solution of swing equation by modified Euler method and Runge-Kutta fourth order method.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

**TEXT BOOKS:**

1. Nagrath L.J. and Kothari D.P., 'Modern Power System Analysis', Tata McGraw-Hill, Fourth Edition, 2011.
2. John J. Grainger and W.D. Stevenson Jr., 'Power System Analysis', Tata McGraw-Hill, Sixth reprint, 2010.
3. P. Venkatesh, B.V. Manikandan, S. Charles Raja, A. Srinivasan, 'Electrical Power Systems-Analysis, Security and Deregulation', PHI Learning Private Limited, New Delhi, 2012.

**REFERENCES:**

1. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
2. Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Pai M.A., 'Computer Techniques in Power System Analysis', Tata McGraw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.
4. J. Duncan Glover, Mulukutla S. Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
5. Olle. I Elgerd, 'Electric Energy Systems Theory — An Introduction', Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, 2012.
6. C.A.Gross, 'Power System Analysis', Wiley India, 2011.


  
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Idhaya Engineering College for Women  
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Kaliakurichi Taluk, Villupuram District

**OBJECTIVES:**

- To educate the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- To introduce the characteristics and functions of relays and protection schemes.
- To impart knowledge on apparatus protection
- To introduce static and numerical relays
- To impart knowledge on functioning of circuit breakers

**UNIT I PROTECTION SCHEMES** 9

Principles and need for protective schemes – nature and causes of faults – types of faults – fault current calculation using symmetrical components – Methods of Neutral grounding – Zones of protection and essential qualities of protection – Protection schemes

**UNIT II ELECTROMAGNETIC RELAYS** 9

Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Overcurrent, Directional, Distance, Differential, Negative sequence and Under frequency relays.

**UNIT III APPARATUS PROTECTION** 9

Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, busbars and transmission line.

**UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION** 9

Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators  
– Block diagram of Numerical relays – Overcurrent protection, transformer differential protection, distant protection of transmission lines.

**UNIT V CIRCUIT BREAKERS** 9

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping - interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF6 and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

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1. Sunil S.Rao, 'Switchgear and Protection', Khanna Publishers, New Delhi, 2008.
2. B.Rabindranath and N.Chander, 'Power System Protection and Switchgear', New Age International (P) Ltd., First Edition 2011.
3. M.L.Soni, P. V. Gupta, U.S.Bhatnagar, A.Chakrabarti, 'A Text Book on Power System Engineering', Dhanpat Rai & Co., 1998.

**REFERENCES:**

1. Badri Ram, B.H. Vishwakarma, 'Power System Protection and Switchgear', New Age International Pvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, 'Fundamentals of power system protection', Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, 'Electrical Power Systems', 6th Edition, New Age International (P) Ltd., 2010
4. Ravindra P.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., New Delhi, 2009.
5. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani, 'Protection and Switchgear' Oxford University Press, 2011.

*Principal*  
PRINCIPAL

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Kallakurichi Taluk, Villupuram District

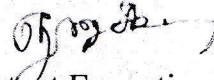
## TANTRANSCO


### TRAINING CERTIFICATE

This is to certify that Selvi. **A.Kalaivani, BE.**, ( EEE , IV<sup>th</sup> Year ) Studying in **IDHAYA ENGINEERING COLLEGE for Women , Chinnasalem** has attended **5 days** In plant Training from **13.05.2019 to 17.05.2019** at **230/110KV Sub Station / Ulundurpet** in Kallakurichi EDC / TANGEDCO / Kallakurichi, as per Memo.No.SE / KEDC /KKI.Ado/ **Adm.1/A1/F.Inplant Trg./ 2019 , Dt. 10.05.2019.**

Station: Ulundurpet.

Date : 17.05.2019

  
Assistant Executive Engineer,  
Maintenance /230/110KV SS,  
Ulundurpet.

  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
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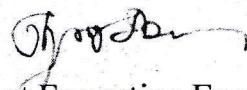
## TANTRANSCO


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This is to certify that Selvi. **K.Shakina, BE.**, ( EEE , IV<sup>th</sup> Year ) Studying in **IDHAYA ENGINEERING COLLEGE for Women , Chinnasalem** has attended **5 days** In plant Training from **13.05.2019 to 17.05.2019** at **230/110KV Sub Station / Ulundurpet** in Kallakurichi EDC / TANGEDCO / Kallakurichi, as per Memo.No.**SE / KEDC /KKI.Ado/ Adm.1/A1/F.Inplant Trg./ 2019 , Dt. 10.05.2019.**

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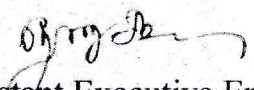
**TANTRANSO**

**TRAINING CERTIFICATE**

This is to certify that Selvi. **Subhashini, BE**, ( EEE , IV<sup>th</sup> Year ) Studying in **IDHAYA ENGINEERING COLLEGE for Women , Chinnasalem** has attended **5 days** In plant Training from **13.05.2019 to 17.05.2019** at **230/110KV Sub Station / Ulundurpet** in Kallakurichi EDC / TANGEDCO / Kallakurichi, as per Memo.No.**SE / KEDC /KKI.Ado/ Adm.1/A1/F.Inplant Trg./ 2019 , Dt. 10.05.2019.**

Station: Ulundurpet.

Date : 17.05.2019

  
Assistant Executive Engineer,  
Maintenance /230/110KV SS,  
Ulundurpet.

  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**



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**TRAINING CERTIFICATE**

This is to certify that Selvi. K.Gayathri, BE., ( EEE , IV<sup>th</sup> Year ) Studying in IDHAYA ENGINEERING COLLEGE for Women , Chinnasalem has attended 5 days In plant Training from 13.05.2019 to 17.05.2019 at 230/110KV Sub Station / Ulundurpet in Kallakurichi EDC / TANGEDCO / Kallakurichi, as per Memo.No.SE / KEDC /KKI.Ado/ Adm.1/A1/F.Inplant Trg./2019, Dt.10.05.2019.

Assistant Executive Engineer,  
Maintenance /230/110KV SS,  
Ulundurpet.

Station: Ulundurpet.  
Date : 17.05.2019

DR.R.GURUMANI, M.E., Ph.D., M.B.A., MISTE., F.I.E.,  
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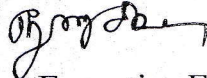
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Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.;  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.

**OBJECTIVES:**

- To educate the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system.
- To introduce the characteristics and functions of relays and protection schemes.
- To impart knowledge on apparatus protection
- To introduce static and numerical relays
- To impart knowledge on functioning of circuit breakers

<b>UNIT I</b>	<b>PROTECTION SCHEMES</b>	<b>9</b>
Principles and need for protective schemes — nature and causes of faults — types of faults — fault current calculation using symmetrical components — Methods of Neutral grounding — Zones of protection and essential qualities of protection — Protection schemes		
<b>UNIT II</b>	<b>ELECTROMAGNETIC RELAYS</b>	<b>9</b>
Operating principles of relays - the Universal relay — Torque equation — R-X diagram — Electromagnetic Relays — Overcurrent, Directional, Distance, Differential, Negative sequence and Under frequency relays.		
<b>UNIT III</b>	<b>APPARATUS PROTECTION</b>	<b>9</b>
Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, busbars and transmission line.		
<b>UNIT IV</b>	<b>STATIC RELAYS AND NUMERICAL PROTECTION</b>	<b>9</b>
Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators – Block diagram of Numerical relays – Overcurrent protection, transformer differential protection, distant protection of transmission lines.		
<b>UNIT V</b>	<b>CIRCUIT BREAKERS</b>	<b>9</b>
Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping - interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF <sub>6</sub> and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.		

**TOTAL : 45 PERIODS****OUTCOMES:**

- Ability to understand and analyze power system operation, stability, control and protection.

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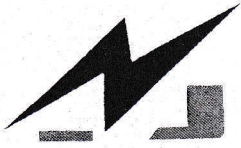
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# ARUL JOTHI ELECTRIC COMPANY

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Tel : 04282 - 231232 Mobile : 99432 59018 Email : aruljothiec@gmail.com

## IMPLANT TRAINING CERTIFICATE

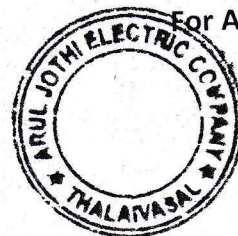
This is to certify that **Selvi .A.Kaviya**, IIIrd year, **B.E(E.E.E)**, student of **IDHAYA ENGINEERING COLLEGE FOR WOMEN, Chinnasalem**, undergone the implant training in our **Arul Jothi Electric company, Mummudi , Thalaivasal, Attur(SALEM)**, during the period from **11.06.2018** to **15.06.2018**.

During the period of training, she learnt different types of transformers, assembling of transformer, winding of transformers, transformer testing, oil testing, and oil filter also.

During the period of training in our company, her conduct and character are very good.


Date : 15.06.2018

Place: Thalaivasal



For Arul Jothi Electric Company,

Manager signature

  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

**OBJECTIVES:**

- To study the structure of electric power system and to develop expressions for the computation of transmission line parameters.
- To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.
- To study the types, construction of cables and methods to improve the efficiency.
- To study about distribution systems, types of substations, methods of grounding, EHVAC, HVDC and FACTS.

<b>UNIT I</b>	<b>TRANSMISSION LINE PARAMETERS</b>	<b>9</b>
Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects - Typical configurations, conductor types and electrical parameters of EHV lines.		
<b>UNIT II</b>	<b>MODELLING AND PERFORMANCE OF TRANSMISSION LINES</b>	<b>9</b>
Performance of Transmission lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines - Power Circle diagrams - Formation of Corona - Critical Voltages - Effect on Line Performance.		
<b>UNIT III</b>	<b>MECHANICAL DESIGN OF LINES</b>	<b>9</b>
Mechanical design of OH lines - Line Supports - Types of towers - Stress and Sag Calculation - Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.		
<b>UNIT IV</b>	<b>UNDER GROUND CABLES</b>	<b>9</b>
Underground cables - Types of cables - Construction of single core and 3 core Cables - Insulation Resistance - Potential Gradient - Capacitance of Single-core and 3 core cables - Grading of cables - Power factor and heating of cables - DC cables.		
<b>UNIT V</b>	<b>DISTRIBUTION SYSTEMS</b>	<b>9</b>
Distribution Systems - General Aspects - Kelvin's Law - AC and DC distributions - Techniques of Voltage Control and Power factor improvement - Distribution Loss - Types of Substations - Methods of Grounding - Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).		
<b>TOTAL :</b>		<b>45 PERIODS</b>

**OUTCOMES:**

- To understand the importance and the functioning of transmission line parameters.
- To understand the concepts of Lines and Insulators.
- To acquire knowledge on the performance of Transmission lines.
- To understand the importance of distribution of the electric power in power system.
- To acquire knowledge on Underground Cables
- To become familiar with the function of different components used in Transmission and Distribution levels of power system and modelling of these components.

**TEXT BOOKS:**

1. D.P.Kothari, I.J. Nagrath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
2. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

**REFERENCES**

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008.
2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. Arun Ingole, "power transmission and distribution" Pearson Education, 2017
4. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2012.
5. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013.
6. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 2013

*meera*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
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# IDHAYA ENGINEERING COLLEGE FOR WOMEN

Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

An ISO 9001 : 2015 Certified Institution

( A Unit of the Franciscan Sisters of the Immaculate Heart of Mary Society, Pondicherry )

**DR .R. GURUMANI**, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
PRINCIPAL

Date:.....  
01.08.2018

Ref: IECW / EEE & ECE / IV / 2018

To

The Manager,  
TRACO Cable Company Ltd,  
Irimpanam,  
Tripunithura.  
Ernakulam (Dist) - 682309  
Kerala.

Sir,

**Sub:** Request for permission to visit your Cable company – Final year EEE and ECE students - Reg

Greetings from Idhaya Engineering College for Women, Chinnasalem.

Idhaya Engineering College for Women is established and managed by Franciscan Sister of the Immaculate Heart of Mary Congregation to provide quality technical and professional education to the deserving women candidates. As a part of their regular curricular activities, every student has to undergo one industrial visit for every theory course offered. Our students of 4<sup>th</sup> year EEE and ECE are very much interested to visit your company. So I am writing this letter to seek permission to visit preferably on 25<sup>th</sup> August, 2018.

Kindly give an orientation of the various facilities available at your company and we would be grateful for the same. We hope for your positive response at the earliest.

No of students in EEE: 22

No of students in ECE: 38

No of staff members accompanying: 04

Thank you

Yours faithfully

*Mani*  
**Dr.R.GURUMANI**, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHY

*Mani 11/8/18*  
**Dr.R.GURUMANI**, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
PRINCIPAL

Chinnasalem - 606 201, Villupuram District, Tamil Nadu.  
Web: [www.iecw.edu.in](http://www.iecw.edu.in) email: [indhaya@iecw.edu.in](mailto:indhaya@iecw.edu.in)  
Tel / Fax : 04151 258225, 258224

**OBJECTIVES:**

To impart knowledge on

- Operation of Three phase electrical circuits and power measurement
- Working principles of Electrical Machines
- Working principle of Various measuring instruments

<b>UNIT I</b>	<b>AC CIRCUITS AND POWER SYSTEMS</b>	<b>9</b>
Three phase power supply – Star connection – Delta connection – Balanced and Unbalanced Loads- Power equation – Star Delta Conversion – Three Phase Power Measurement - Transmission & Distribution of electrical energy – Over head Vs Underground system – Protection of power system – types of tariff – power factor improvement		
<b>UNIT II</b>	<b>TRANSFORMER</b>	<b>9</b>
Introduction - Ideal Transformer – Accounting For Finite Permeability And Core Loss – Circuit Model Of Transformer – Per Unit System – Determination Of Parameters Of Circuit Model Of Transformer – Voltage Regulation – Name Plate Rating – Efficiency – Three Phase Transformers -Auto Transformers		
<b>UNIT III</b>	<b>DC MACHINES</b>	<b>9</b>
Introduction – Constructional Features– <b>Motoring and generation principle</b> - Emf And Torque equation – Circuit Model – Methods of Excitation and magnetisation characteristics – Starting and Speed Control – Universal Motor		
<b>UNIT IV</b>	<b>AC MACHINES</b>	<b>9</b>
Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit, Single phase Induction motors -Construction– Types–starting and speed control methods. Alternator- working principle–Equation of induced EMF – Voltage regulation, Synchronous motors- working principle-starting methods – Torque equation – Stepper Motors – Brushless DC Motors		
<b>UNIT V</b>	<b>MEASUREMENT AND INSTRUMENTATION</b>	<b>9</b>
Type of Electrical and electronic instruments – Classification- Types of indicating Instruments – Principles of Electrical Instruments –Multimeters, Oscilloscopes- Static and Dynamic Characteristics of Measurement – Errors in Measurement – Transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical		

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At the end of the course the students will be able to**

- Understand the concept of three phase power circuits and measurement.
- Comprehend the concepts in electrical generators, motors and transformers
- Choose appropriate measuring instruments for given application

**TEXT BOOKS:**

1. D P Kothari and I.J Nagarath, —Basic Electrical and Electronics EngineeringI, McGraw Hill Education(India) Private Limited, Third Reprint ,2016
2. Giorgio Rizzoni, —Principles and Applications of Electrical EngineeringI, McGraw Hill Education(India) Private Limited, 2010
3. S.K.Bhattacharya —Basic Electrical and Electronics EngineeringI, Pearson India, 2011

**REFERENCES:**

1. Del Toro ,IElectrical Engineering FundamentalsI, Pearson Education, New Delhi, 2015.
2. Leonard S Bobrow, — Foundations of Electrical EngineeringI, Oxford University Press, 2013
3. Rajendra Prasad ,IFundamentals of Electrical engineeringI, Prentice Hall of India, 2006.
4. Mittle N., —Basic Electrical EngineeringI, Tata McGraw Hill Edition, 24<sup>th</sup> reprint 2016
5. A.E.Fitzgerald, David E Higginbotham and Arvin Gabel, —Basic Electrical EngineeringI, McGraw Hill Education(India) Private Limited, 2009

*Ravi*  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**



# IDHAYA ENGINEERING COLLEGE FOR WOMEN

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**DR .R. GURUMANI**, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
PRINCIPAL

Date:.....  
01.08.2018

Ref: IECW / EEE & ECE / IV / 2018

To

The Manager,  
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Irimpanam,  
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Sir,

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No of students in ECE: 38

No of staff members accompanying: 04

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Yours faithfully

*Mani*  
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IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHU

*Mani 11/11/18*  
**Dr.R.GURUMANI**, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
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Web: [www.iecw.edu.in](http://www.iecw.edu.in) email: [indhaya@iecw.edu.in](mailto:indhaya@iecw.edu.in)  
Tel / Fax : 04151 258225, 258224



**OBJECTIVES:**

- To introduce the concepts of various analog modulations and their spectral characteristics.
- To understand the properties of random process.
- To know the effect of noise on communication systems.
- To study the limits set by Information Theory.

**UNIT I AMPLITUDE MODULATION**

Generation and detection of AM wave-spectra-DSBSC, Hilbert Transform, Pre-envelope & complex envelope - SSB and VSB –comparison -Superheterodyne Receiver. 9

**UNIT II ANGLE MODULATION**

Phase and frequency modulation-Narrow Band and Wide band FM - Spectrum - FM modulation and demodulation – FM Discriminator- PLL as FM Demodulator - Transmission bandwidth. 9

**UNIT III RANDOM PROCESS**

Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter. 9

**UNIT IV NOISE CHARACTERIZATION**

Noise sources and types – Noise figure and noise temperature – Noise in cascaded systems. Narrowband noise – PSD of in-phase and quadrature noise -Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect. 9

**UNIT V INFORMATION THEORY**

Entropy - Discrete Memoryless channels - Channel Capacity -Hartley - Shannon law - Source coding theorem - Huffman & Shannon - Fano codes 9

**TOTAL: 45  
PERIODS**

**OUTCOMES:****At the end of the course, the students would**

- Design AM communication systems.
- Design Angle modulated communication systems
- Apply the concepts of Random Process to the design of Communication systems
- Analyze the noise performance of AM and FM systems

**TEXT BOOKS:**

1. J.G.Proakis, M.Salehi, "Fundamentals of Communication Systems", Pearson Education 2006.
2. S. Haykin, "Digital Communications", John Wiley, 2005.

**REFERENCES:**

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3<sup>rd</sup> Edition, Oxford University Press, 2007.
2. B.Sklar, "Digital Communications Fundamentals and Applications", 2<sup>nd</sup> Edition Pearson Education 2007
3. H P Hsu, Schaum Outline Series - "Analog and Digital Communications" TMH 2006
4. Couch.L., "Modern Communication Systems", Pearson, 2001.

  
PRINCIPAL

Idhaya Engineering College for Women  
Nainarpalaym Road, CHINNASALEM  
Kallakurichi Taluk, Villupuram District

**OBJECTIVES:**

- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

<b>UNIT I</b>	<b>SEMICONDUCTOR DIODE</b>	<b>9</b>
	PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes.	
<b>UNIT II</b>	<b>BIPOLAR JUNCTION TRANSISTORS</b>	<b>9</b>
	NPN -PNP -Operations-Early effect-Current equations – Input and Output characteristics of CE, CB, CC - Hybrid - $\pi$ model - h-parameter model, Ebers Moll Model- Gummel Poon-model, MultiEmitter Transistor.	
<b>UNIT III</b>	<b>FIELD EFFECT TRANSISTORS</b>	<b>9</b>
	JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D- MOSFET, E-MOSFET- Characteristics – Comparison of MOSFET with JFET.	
<b>UNIT IV</b>	<b>SPECIAL SEMICONDUCTOR DEVICES</b>	<b>9</b>
	Metal-Semiconductor Junction- MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET, Schottky barrier diode-Zener diode-Varactor diode –Tunnel diode- Gallium Arsenide device, LASER diode, LDR.	
<b>UNIT V</b>	<b>POWER DEVICES AND DISPLAY DEVICES</b>	<b>9</b>
	UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.	

**TOTAL : 45 PERIODS****OUTCOMES:****At the end of the course the students will be able to:**

- Explain the V-I characteristic of diode, UJT and SCR
- Describe the equivalence circuits of transistors
- Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

**TEXT BOOKS:**

- Donald A Neaman, —Semiconductor Physics and Devices, Fourth Edition, Tata Mc GrawHillInc. 2012.
- Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, —Electronic Devices and circuits, Third Edition, Tata McGraw- Hill, 2008.

**REFERENCES:**

- Robert Boylestad and Louis Nashelsky, —Electron Devices and Circuit Theory, Pearson Prentice Hall, 10th edition, July 2008.
- R.S.Sedha, — A Text Book of Applied Electronics, S.Chand Publications, 2006.
- Yang, —Fundamentals of Semiconductor devices, McGraw Hill International Edition, 1978.

*Ravi*  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**



**A DATA TRANSFER THROUGH SOIL  
USING WIRELESS UNDERGROUND  
SENSOR NETWORKS.**



A PROJECT REPORT

*Submitted by*

**FARHANA.A**

621115106009

**JENIFER SHARMILA.S**

621115106014

**PRITHIYA.G**

621115106027

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

*in*

**ELECTRONICS AND COMMUNICATION ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY :: CHENNAI-600 025**

**APRIL 2019**

i

*Ramani*  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., MISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201, KALLAKURICHI DT.**

ANNA UNIVERSITY :: CHENNAI-600 025

BONAFIDE CERTIFICATE

Certified that this project report "A DATA TRANSFER THROUGH SOIL USING WIRELESS UNDERGROUND SENSOR NETWORKS" is the bonafide work of "A.FARHANA", "S.JENIFER SHARMILA" and "G.PRITHIYA" who carried out the project work under my supervision.

*Dr. S.A. Jeeva*  
1.4.19

SIGNATURE

*Dr. W. Selvi*  
1.4.19

SIGNATURE

Dr.S.A AMUDHA JEEVA KUMAR, M.E., Ph.D,

Mrs. W.SELVI., M.E.,

HEAD OF THE DEPARTMENT

SUPERVISOR

Professor/ECE,

Assistant Professor/ECE,

Idhaya Engineering College for women

Idhaya engineering college for women

Chinnasalem-606 201.

Chinnasalem-606 201.

*Dr. W. Selvi*  
2.4.19

INTERNAL EXAMINER

*R. R. Guramani*  
2.4.19

EXTERNAL EXAMINER

## ABSTRACT

Wireless Underground Sensor Networks (WUSNs) constitute one of the promising application areas of the recently developed wireless sensor networking techniques. WUSN is a specialized kind of WSN that mainly focuses on the use of sensors at the subsurface region of the soil. For a long time, this region has been used to bury sensors, usually targeting irrigation and environment monitoring applications, although without wireless communication Capability; WUSNs promise to fill this gap and to provide the infrastructure for novel applications. The underground wireless channel was only available recently. Communication through the underground medium has been a challenging research area. The applications require the deployment of sensors below the ground surface. Hence, the sensor become part of the sensed environment and might deliver more precise sensing.

WUSNs, which have components, i.e. the sensors, that are buried underground and that communicate through soil. The majority of the applications for WUSNs – intelligent agriculture, environmental monitoring, of the soil.



**A SCHEME TO DESIGN CONCURRENT  
ERROR DETECTION TECHNIQUES FOR THE  
FAST FOURIER TRANSFORM IMPLEMENTED  
IN SRAM-BASED FPGAS**



**A PROJECT REPORT**

*Submitted by*

**NAMBIKKAI MARY.A**

621115106023

**SUPRAJA.M**

621115106039

**VINOLIYA MERCY.J**

621115106040

*in partial fulfillment for the award of the degree*

*of*

**BACHELOR OF ENGINEERING**

**IN**


**ELECTRONICS AND COMMUNICATION ENGINEERING**

**IDHAYA ENGINEERING COLLEGE for WOMEN**

**CHINNASALEM**

**ANNA UNIVERSITY: CHENNAI-600 025**

**APRIL 2019**

  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.IE.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.**

ANNA UNIVERSITY::CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "A SCHEME TO DESIGN CONCURRENT ERROR DETECTION TECHNIQUES FOR THE FAST FOURIER TRANSFORM IMPLEMENTED IN SRAM-BASED FPGAS" is the bonafide work of "NAMBIKKAI MARY.A, SUPRAJA.M, VINOLIYA MERCY.J" who carried out the project work under my supervision.

*J.S.A. Jeeva*  
1.4.19

SIGNATURE

*J. Sumitha Josphine*  
SIGNATURE

Dr. S.A. AMUTHA JEEVA KUMARI., Ms. J.SUMITHA JOSPHINE.,  
M.E., Ph.D., M.E.,

HEAD OF THE DEPARTMENT

SUPERVISOR

Assistant Professor

Department of ECE,

Department of ECE,

Idhaya Engineering College

Idhaya Engineering College

for Women,

for Women,

Chinnasalem-606 201.

Chinnasalem-606 201.

*J.S.A. Jeeva*  
2.4.19

INTERNAL EXAMINER

*R. P. L.*  
21.4.19

EXTERNAL EXAMINER

*R. P. L.*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., MISTE, FIEE,  
R. WASTE, FIEE,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHIDT.**

## ABSTRACT

Soft errors are an important issue for SRAM-based Field Programmable Gate Arrays (FPGAs), since they result in permanent alterations of the mapped circuit when they affect their configuration memory. Concurrent Error Detection (CED) techniques, such as Dual Modular Redundancy (DMR), are usually employed to detect errors that affect the performance of the circuit. When trying to detect errors produced on the complex Fast Fourier Transform (FFT), the Parseval Sum of Squares (SoS) is a widely used technique.

In this project, we present a scheme to implement CED techniques for the complex FFT implemented in SRAM-based FPGAs. These techniques perform checks based on the relationships existing between one or more of the inputs and the outputs of the algorithm. These techniques are provided to further clarify how to construct them. These techniques, along with DMR and SoS, have been tested through fault injection. An analysis on their error detection capabilities shows that they achieve high detection rates with much less resource usage than DMR and SoS. In addition, the number of false error detections for these techniques is lower than that of SoS, which leads to less unnecessary reconfigurations of the device.

*R. Guramani*  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.



**OBJECTIVES:**

- To understand the methods of biasing transistors
- To design and analyze single stage and multistage amplifier circuits
- To analyze the frequency response of small signal amplifiers
- To design and analyze the regulated DC power supplies.
- To troubleshoot and fault analysis of power supplies.

**UNIT I BIASING OF DISCRETE BJT, JFET AND MOSFET** 9

BJT– Need for biasing - DC Load Line and Bias Point – DC analysis of Transistor circuits - Various biasing methods of BJT – Bias Circuit Design - Thermal stability - Stability factors - Bias compensation techniques using Diode, thermistor and sensistor – Biasing BJT Switching Circuits- JFET - DC Load Line and Bias Point - Various biasing methods of JFET - JFET Bias Circuit Design - MOSFET Biasing - Biasing FET Switching Circuits.

**UNIT II BJT AMPLIFIERS** 9

Small Signal Hybrid  $\pi$  equivalent circuit of BJT – Early effect - Analysis of CE, CC and CB amplifiers using Hybrid  $\pi$  equivalent circuits - AC Load Line Analysis- Darlington Amplifier - Bootstrap technique - Cascade, Cascode configurations - Differential amplifier, Basic BJT differential pair – Small signal analysis and CMRR.

**UNIT III SINGLE STAGE FET, MOSFET AMPLIFIERS**

Small Signal Hybrid  $\pi$  equivalent circuit of FET and MOSFET - Analysis of CS, CD and CG amplifiers using Hybrid  $\pi$  equivalent circuits - Basic FET differential pair- BiCMOS circuits.

**UNIT IV FREQUENCY RESPONSE OF AMPLIFIERS** 9

Amplifier frequency response – Frequency response of transistor amplifiers with circuit capacitors – BJT frequency response – short circuit current gain - cut off frequency –  $f_{\alpha}$ ,  $f_{\beta}$  and unity gain bandwidth – Miller effect - frequency response of FET - High frequency analysis of CE and MOSFET CS amplifier - Transistor Switching Times.

**UNIT V POWER SUPPLIES AND ELECTRONIC DEVICE TESTING** 9

Linear mode power supply - Rectifiers - Filters - Half-Wave Rectifier Power Supply - Full-Wave Rectifier Power Supply - Voltage regulators: Voltage regulation - Linear series, shunt and switching Voltage Regulators - Over voltage protection - BJT and MOSFET – Switched mode power supply (SMPS) - Power Supply Performance and Testing - Troubleshooting and Fault Analysis, Design of Regulated DC Power Supply.

**TOTAL: 45 PERIODS****OUTCOMES:****After studying this course, the student should be able to:**

- Acquire knowledge of
  - Working principles, characteristics and applications of BJT and FET
  - Frequency response characteristics of BJT and FET amplifiers
- Analyze the performance of small signal BJT and FET amplifiers - single stage and multistage amplifiers
- Apply the knowledge gained in the design of Electronic circuits

**TEXT BOOKS:**

1. Donald. A. Neamen, Electronic Circuits Analysis and Design, 3<sup>rd</sup> Edition, Mc Graw Hill Education (India) Private Ltd., 2010. (Unit I-IV)
2. Robert L. Boylestad and Louis Nasheresky, —Electronic Devices and Circuit Theory, 11<sup>th</sup> Edition, Pearson Education, 2013. (Unit V)

**REFERENCES**

1. Millman J, Halkias.C.and Sathyabrada Jit, Electronic Devices and Circuits, 4<sup>th</sup> Edition, Mc Graw Hill Education (India) Private Ltd., 2015.
2. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4<sup>th</sup> Edition, Mc Graw Hill Education (India) Private Ltd., 2017.
3. Floyd, Electronic Devices, Ninth Edition, Pearson Education, 2012.
4. David A. Bell, Electronic Devices & Circuits, 5<sup>th</sup> Edition, Oxford University Press, 2008.
5. Anwar A. Khan and Kanchan K. Dey, A First Course on Electronics, PHL 2006.

*M. S. S.*  
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**OBJECTIVES:**

- To understand the basic properties of signal & systems
- To know the methods of characterization of LTI systems in time domain
- To analyze continuous time signals and system in the Fourier and Laplace domain
- To analyze discrete time signals and system in the Fourier and Z transform domain

<b>UNIT I</b>	<b>CLASSIFICATION OF SIGNALS AND SYSTEMS</b>	<b>12</b>
Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids_ Classification of signals — Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems- CT systems and DT systems- — Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.		
<b>UNIT II</b>	<b>ANALYSIS OF CONTINUOUS TIME SIGNALS</b>	<b>12</b>
Fourier series for periodic signals - Fourier Transform — properties- Laplace Transforms and properties		
<b>UNIT III</b>	<b>LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS</b>	<b>12</b>
Impulse response - convolution integrals- Differential Equation- Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.		
<b>UNIT IV</b>	<b>ANALYSIS OF DISCRETE TIME SIGNALS</b>	<b>12</b>
Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT - Z Transform & Properties		
<b>UNIT V</b>	<b>LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS</b>	<b>12</b>
Impulse response — Difference equations-Convolution sum- Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems-DT systems connected in series and parallel.		

**TOTAL: 60 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**


- To be able to determine if a given system is linear/causal/stable
- Capable of determining the frequency components present in a deterministic signal
- Capable of characterizing LTI systems in the time domain and frequency domain
- To be able to compute the output of an LTI system in the time and frequency domains

**TEXT BOOK:**

1. Allan V. Oppenheim, S. Wilsky and S.H. Nawab, —Signals and Systems, Pearson, 2015.(Unit 1-V)

**REFERENCES**

1. B. P. Lathi, —Principles of Linear Systems and Signals, Second Edition, Oxford, 2009.
2. R.E. Zeimer, W.H. Tranter and R.D. Fannin, —Signals & Systems - Continuous and Discrete, Pearson, 2007.
3. John Alan Stuller, —An Introduction to Signals and Systems, Thomson, 2007.

  
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**IoT BASED HYBRID AGRICULTURAL  
LAND MONITORING SYSTEM USING  
INTENSIVE PRAGMATIC BLOSSOMS**



**CLASSIFICATION**

A PROJECT REPORT

*Submitted by*

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621115106022

*In partial fulfillment for the award of the degree  
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**BACHELOR OF ENGINEERING**

**IN**

**ELECTRONICS AND COMMUNICATION ENGINEERING**

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**APRIL 2019**

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**BONAFIDE CERTIFICATE**

Certified that this project report "IoT BASED HYBRID AGRICULTURAL LAND MONITORING SYSTEM USING INTENSIVE PRAGMATIC BLOSSOMS CLASSIFICATION" is the bonafide work of "A.ANUSUYA, S.ISHWARYA, S.KAVIYARASI, D.MONICA SELLUS" who carried out the project work under my supervision.

*J.S. Agudha*  
2.4.19

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## ABSTRACT

Internet of things (IoT) is a system consists of actuators or sensors or both that provides connectivity to the internet directly or indirectly. Its advances can be used in smart farming to enhance quality of agriculture. Agriculture, the backbone of Indian economy, contributes to the overall economic growth of the country. But our productivity is very less as compared to world standards due to the use of obsolete farming technology. Innovation in farming is not new but IoT is set to push smart farming to next level. In this work, an Gaussian filter has been connected to enter pictures for noise removal took after by K-means Image segmentation procedure utilizing enlargement morphology for segmentation of disease identification. Then the disease, plant growth status and moisture level classification is done by using Intensive Pragmatic Classification Technique. The result of land monitoring activities is transferred to users via the IoT domain. The proposed strategy demonstrates the specificity of 92.44%, a sensitivity of 95.82% and an Accuracy of 98.02%. It clarifies that the proposed design is fit for identify the disease, growth & moisture of land from plant images and its capability to help the farmers in the society.

  
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**OBJECTIVES:**

- To give a comprehensive exposure to all types of amplifiers and oscillators constructed with discrete components. This helps to develop a strong basis for building linear and digital integrated circuits
- To study about feedback amplifiers and oscillators principles
- To design oscillators.
- To study about turned amplifier.
- To understand the analysis and design of LC and RC oscillators, amplifiers, multivibrators, power amplifiers and DC convertors.

<b>UNIT I</b>	<b>FEEDBACK AMPLIFIERS AND STABILITY</b>	<b>9</b>
	Feedback Concepts – gain with feedback – effect of feedback on gain stability, distortion, bandwidth, input and output impedances; topologies of feedback amplifiers – analysis of series-series, shunt-shunt and shunt-series feedback amplifiers-stability problem-Gain and Phase-margins-Frequency compensation.	
<b>UNIT II</b>	<b>OSCILLATORS</b>	<b>9</b>
	Barkhausen criterion for oscillation – phase shift, Wien bridge - Hartley & Colpitt's oscillators – Clapp oscillator-Ring oscillators and crystal oscillators – oscillator amplitude stabilization.	
<b>UNIT III</b>	<b>TUNED AMPLIFIERS</b>	<b>9</b>
	Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers – Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers - Stability of tuned amplifiers – Neutralization - Hazeltine neutralization method.	
<b>UNIT IV</b>	<b>WAVE SHAPING AND MULTIVIBRATOR CIRCUITS</b>	<b>9</b>
	Pulse circuits – attenuators – RC integrator and differentiator circuits – diode clampers and clippers – Multivibrators - Schmitt Trigger- UJT Oscillator.	
<b>UNIT V</b>	<b>POWER AMPLIFIERS AND DC CONVERTERS</b>	<b>9</b>
	Power amplifiers- class A-Class B-Class AB-Class C-Power MOSFET-Temperature Effect- Class AB Power amplifier using MOSFET –DC/DC convertors – Buck, Boost, Buck-Boost analysis and design	

**TOTAL: 45 PERIODS**

**OUTCOMES:****Upon completion of the course, the student should be able to:**

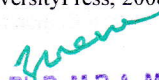
- Analyze different types of amplifier, oscillator and multivibrator circuits
- Design BJT amplifier and oscillator circuits
- Analyze transistorized amplifier and oscillator circuits
- Design and analyze feedback amplifiers
- Design LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, power amplifier and DC convertors.

**TEXT BOOKS:**

1. Sedra and Smith, —Micro Electronic Circuits; Sixth Edition, Oxford University Press, 2011. (UNIT I, III, IV, V)
2. Jacob Millman, 'Microelectronics', McGraw Hill, 2nd Edition, Reprinted, 2009. (UNIT I, II, IV, V)

**REFERENCES:**

1. Robert L. Boylestad and Louis Nasheresky, —Electronic Devices and Circuit Theory, 10th Edition, Pearson Education / PHI, 2008
2. David A. Bell, —Electronic Devices and Circuits, Fifth Edition, Oxford University Press, 2008.
3. Millman J. and Taub H., —Pulse Digital and Switching Waveforms, TMH, 2000.
4. Millman and Halkias, C., Integrated Electronics, TMH, 2007.

  
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**A SCHEME TO DESIGN CONCURRENT  
ERROR DETECTION TECHNIQUES FOR THE  
FAST FOURIER TRANSFORM IMPLEMENTED  
IN SRAM-BASED FPGAS**



**A PROJECT REPORT**

*Submitted by*

**NAMBIKKAI MARY.A**

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**SUPRAJA.M**

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**621115106040**

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BONAFIDE CERTIFICATE

Certified that this project report "A SCHEME TO DESIGN CONCURRENT ERROR DETECTION TECHNIQUES FOR THE FAST FOURIER TRANSFORM IMPLEMENTED IN SRAM-BASED FPGAS" is the bonafide work of "NAMBIKKAI MARY.A, SUPRAJA.M, VINOLIYA MERCY.J" who carried out the project work under my supervision.

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1.4.19

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*J. Sumitha Josphine*  
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## ABSTRACT

Soft errors are an important issue for SRAM-based Field Programmable Gate Arrays (FPGAs), since they result in permanent alterations of the mapped circuit when they affect their configuration memory. Concurrent Error Detection (CED) techniques, such as Dual Modular Redundancy (DMR), are usually employed to detect errors that affect the performance of the circuit. When trying to detect errors produced on the complex Fast Fourier Transform (FFT), the Parseval Sum of Squares (SoS) is a widely used technique.

In this project, we present a scheme to implement CED techniques for the complex FFT implemented in SRAM-based FPGAs. These techniques perform checks based on the relationships existing between one or more of the inputs and the outputs of the algorithm. These techniques are provided to further clarify how to construct them. These techniques, along with DMR and SoS, have been tested through fault injection. An analysis on their error detection capabilities shows that they achieve high detection rates with much less resource usage than DMR and SoS. In addition, the number of false error detections for these techniques is lower than that of SoS, which leads to less unnecessary reconfigurations of the device.

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**EC8451****ELECTROMAGNETIC FIELDS**

L	T	P	C
4	0	0	4

**OBJECTIVES:**

- To gain conceptual and basic mathematical understanding of electric and magnetic fields in free space and in materials
- To understand the coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations
- To understand wave propagation in lossless and in lossy media
- To be able to solve problems based on the above concepts

**UNIT I INTRODUCTION** 12

Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Null identities, Helmholtz's theorem

**UNIT II ELECTROSTATICS** 12

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Boundary conditions, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations, Uniqueness of electrostatic solutions, Current density and Ohm's law, Electromotive force and Kirchhoff's voltage law, Equation of continuity and Kirchhoff's current law

**UNIT III MAGNETOSTATICS** 12

Lorentz force equation, Law of no magnetic monopoles, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Magnetic circuits, Behaviour of magnetic materials, Boundary conditions, Inductance and inductors, Magnetic energy, Magnetic forces and torques

**UNIT IV TIME-VARYING FIELDS AND MAXWELL'S EQUATIONS** 12

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields

**UNIT V PLANE ELECTROMAGNETIC WAVES** 12

Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

**TOTAL:60 PERIODS****OUTCOMES:**

By the end of this course, the student should be able to:

- Display an understanding of fundamental electromagnetic laws and concepts
- Write Maxwell's equations in integral, differential and phasor forms and explain their physical meaning
- Explain electromagnetic wave propagation in lossy and in lossless media
- Solve simple problems requiring estimation of electric and magnetic field quantities based on these concepts and laws

**TEXT BOOKS:**

1. D.K. Cheng, Field and wave electromagnetics, 2nd ed., Pearson (India), 1989 (UNIT I, II, III, IV, V)
2. W.H. Hayt and J.A. Buck, Engineering electromagnetics, 7th ed., McGraw-Hill (India), 2006 (UNIT I-V)

**REFERENCES**

1. D.J. Griffiths, Introduction to electrodynamics, 4th ed., Pearson (India), 2013
2. B.M. Notaros, Electromagnetics, Pearson: New Jersey, 2011
3. M.N.O. Sadiku and S.V. Kulkarni, Principles of electromagnetics, 6th ed., Oxford (Asian Edition), 2015

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**MEDICAL IMAGE FUSION USING  
SECOND GENERATION CURVELET  
TRANSFORM**



A PROJECT REPORT

*Submitted by*

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**BONAFIDE CERTIFICATE**

Certified that this project report "MEDICAL IMAGE FUSION USING SECOND GENERATION CURVELET TRANSFORM" is the bonafide Work "M.ARULMOZHI, T.DIVYABHARATHI,S.MERLINSONA, A.RANI" who carried out the project work under my supervision.

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## ABSTRACT

Image fusion is the process of collecting the useful information from the different images and integrate them into the single image, thereby hidden information in the images are obtained .The main purpose of the image fusion is to reduce the data which are present in the image but also to construct the appropriate information in the images which are easily understandable by both human and machine perception. It is a data fusion technology which keeps images as main research contents. Multi-scale-based image fusion is one of main fusion methods, in which multi-scale decomposition tool and feature extraction play very important roles.

The Discrete Curvelet transform (DCT) is one of the effective multi-scale decomposition tools. Therefore, this paper proposes a novel multimodal image fusion method using DCT and multiple features. First, we perform DCT on each source image to obtain low frequency coefficients and high-frequency coefficients. Second, a weighted average fusion rule based on the phase and magnitude of low-frequency sub band and spatial variance is proposed a method is conducted on multi-focus images, medical images, infrared-visible images, and remote sensing images, respectively. This project introduces the Second Generation Curvelet Transform and uses it to fuse images.

## DIGITAL ELECTRONICS

EC8392

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To present the Digital fundamentals, Boolean algebra and its applications in digital systems
- To familiarize with the design of various combinational digital circuits using logic gates
- To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits
- To explain the various semiconductor memories and related technology
- To introduce the electronic circuits involved in the making of logic gates

### UNIT I DIGITAL FUNDAMENTALS

9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

### UNIT II COMBINATIONAL CIRCUIT DESIGN

9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry lookahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

### UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS

9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

### UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS

9

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.

### UNIT V MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS

9

Basic memory structure – ROM -PROM – EPROM – EEPROM –EAPROM, RAM – Static and dynamic RAM - Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PLA, PAL.

Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan- in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS

TOTAL: 45 PERIODS

### OUTCOMES:

#### At the end of the course:

- Use digital electronics in the present contemporary world
- Design various combinational digital circuits using logic gates
- Do the analysis and design procedures for synchronous and asynchronous sequential circuits
- Use the semiconductor memories and related technology
- Use electronic circuits involved in the design of logic gates

### TEXT BOOK:

1. M. Morris Mano and Michael D. Ciletti, —Digital DesignI, 5th Edition, Pearson, 2014.

### REFERENCES:

1. Charles H.Roth. —Fundamentals of Logic DesignI, 6th Edition, Thomson Learning, 2013.
2. Thomas L. Floyd, —Digital FundamentalsI, 10th Edition, Pearson Education Inc, 2011
3. S.Salivahanan and S.Arivazhagan—Digital ElectronicsI, 1st Edition, Vikas PublishingHouse pvt Ltd, 2012.
4. Anil K.Maini —Digital ElectronicsI, Wiley, 2014.
5. A.Anand Kumar —Fundamentals of Digital CircuitsI, 4th Edition, PHI Learning Private Limited, 2016.
6. Soumitra Kumar Mandal — Digital ElectronicsI, McGraw Hill Education Private Limited, 2016.

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EC8391

CONTROL SYSTEMS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the components and their representation of control systems
- To learn various methods for analyzing the time response, frequency response and stability of the systems.
- To learn the various approach for the state variable analysis.

UNIT I SYSTEMS COMPONENTS AND THEIR REPRESENTATION 9

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory- Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphs models-DC and AC servo Systems-Synchronous -Multivariable control system

UNIT II TIME RESPONSE ANALYSIS 9

Transient response-steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control-Analytical design for PD, PI, PID control systems

UNIT III FREQUENCY RESPONSE AND SYSTEM ANALYSIS 9

Closed loop frequency response-Performance specification in frequency domain-Frequency response of standard second order system- Bode Plot - Polar Plot- Nyquist plots-Design of compensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascade lead compensation

UNIT IV CONCEPTS OF STABILITY ANALYSIS 9

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus-Nyquist stability criterion.

UNIT V CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS 9

State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer function and state variable representations-State variable analysis of digital control system-Digital control design using state feedback.

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Identify the various control system components and their representations.
- Analyze the various time domain parameters.
- Analysis the various frequency response plots and its system.
- Apply the concepts of various system stability criterions.
- Design various transfer functions of digital control system using state variable models.

TEXT BOOK:

1. M.Gopal, —Control System – Principles and Design, Tata McGraw Hill, 4th Edition, 2012.

REFERENCES:

1. J.Nagrath and M.Gopal, —Control System Engineering, New Age International Publishers, 5<sup>th</sup> Edition, 2007.
2. K. Ogata, 'Modern Control Engineering', 5th edition, PHI, 2012.
3. S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pearson, 2013.
4. Benjamin.C.Kuo, —Automatic control systems, Prentice Hall of India, 7th Edition, 1995.

*Review*  
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EC8453

**LINEAR INTEGRATED CIRCUITS**

L T P C  
3 0 0 3

**OBJECTIVES:**

- To introduce the basic building blocks of linear integrated circuits
- To learn the linear and non-linear applications of operational amplifiers
- To introduce the theory and applications of analog multipliers and PLL
- To learn the theory of ADC and DAC
- To introduce the concepts of waveform generation and introduce some special function ICs

**UNIT I BASICS OF OPERATIONAL AMPLIFIERS 9**

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations —JFET Operational Amplifiers – LF155 and TL082.

**UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9**

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

**UNIT III ANALOG MULTIPLIER AND PLL 9**

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell — Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing and clock synchronisation.

**UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 9**

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters, Sigma – Delta converters.

**UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs 9**

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators — Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator, Low Drop — Out(LDO) Regulators - Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

**TOTAL:45 PERIODS**

**TEXT BOOKS:**

1. D.Roy Choudhry, Shail Jain, —Linear Integrated Circuits, New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V)
2. Sergio Franco, —Design with Operational Amplifiers and Analog Integrated Circuits, 4th Edition, Tata Mc Graw-Hill, 2016 (Unit I – V)

**REFERENCES:**

1. Ramakant A. Gayakwad, —OP-AMP and Linear ICs, 4th Edition, Prentice Hall / Pearson Education, 2015.
2. Robert F. Coughlin, Frederick F. Driscoll, —Operational Amplifiers and Linear Integrated Circuits, Sixth Edition, PHI, 2001.
3. B.S.Sonde, —System design using Integrated Circuits, 2nd Edition, New Age Pub, 2001.
4. Gray and Meyer, —Analysis and Design of Analog Integrated Circuits, Wiley International, 5<sup>th</sup> Edition, 2009.
5. William D. Stanley, —Operational Amplifiers with Linear Integrated Circuits, Pearson Education, 4<sup>th</sup> Edition, 2001.
6. S.Salivahanan & V.S. Kanchana Bhaskaran, —Linear Integrated Circuits, TMH, 2<sup>nd</sup> Edition, 4<sup>th</sup> Reprint, 2016.

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**MEDICAL IMAGE FUSION USING  
SECOND GENERATION CURVELET  
TRANSFORM**



**A PROJECT REPORT**

*Submitted by*

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*of*

**BACHELOR OF ENGINEERING**

*in*

**ELECTRONICS AND COMMUNICATION ENGINEERING**

**IDHAYA ENGINEERING COLLEGE FOR WOMEN**

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**BONAFIDE CERTIFICATE**

Certified that this project report "MEDICAL IMAGE FUSION USING SECOND GENERATION CURVELET TRANSFORM" is the bonafide Work "M.ARULMOZHI, T.DIVYABHARATHI,S.MERLINSONA, A.RANI" who carried out the project work under my supervision.

*S.A. Jeeva*  
*24.19*  
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## ABSTRACT

Image fusion is the process of collecting the useful information from the different images and integrate them into the single image, thereby hidden information in the images are obtained .The main purpose of the image fusion is to reduce the data which are present in the image but also to construct the appropriate information in the images which are easily understandable by both human and machine perception. It is a data fusion technology which keeps images as main research contents. Multi-scale-based image fusion is one of main fusion methods, in which multi-scale decomposition tool and feature extraction play very important roles.

The Discrete Curvelet transform (DCT) is one of the effective multi-scale decomposition tools. Therefore, this paper proposes a novel multimodal image fusion method using DCT and multiple features. First, we perform DCT on each source image to obtain low frequency coefficients and high-frequency coefficients. Second, a weighted average fusion rule based on the phase and magnitude of low-frequency sub band and spatial variance is proposed a method is conducted on multi-focus images, medical images, infrared-visible images, and remote sensing images, respectively. This project introduces the Second Generation Curvelet Transform and uses it to fuse images.



**MED-PENETRATION UNIT FOR  
CRITICAL PATIENTS**



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**BONAFIDE CERTIFICATE**

Certified that this project report "MED-PENETRATION UNIT FOR CRITICAL PATIENTS" is the bonafide work of "GOLDA REMINA MARY.A, PREMALATHA.E and SANGEETHA.V" who carried out the project under my supervision.

  
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## ABSTRACT

Health plays a vital role in our daily life. Sound health is necessary to do the daily work properly. In rural hospitals, the facilities for health caring are very limited. The poor quality of health management enables issues in health care system. Everyone should get the knowledge of own health as easy and early as possible. Also it should be worth for each. Latest report of The India Spend analysis of data says that the 500,000 doctors shortage in India. World Health Organization defines the doctor patient ratio will be 1:1000 which has been failed in India. The increased use of embedded technologies and smart devices in the area of health has caused great impact on the world.

In order to overcome the above issues, we developed the project. The main aim of the project is to monitor, analyze, display, send message about the health status of the patients and infuse the first aid medicine to the critical patients. The body temperature, heart beat and pressure level of the patient are sensed using respective sensors and display it in the LCD display and send the health status of the patient to the doctor through GSM module. If the body temperature, heart beat and blood pressure of the patient become high or low, the pump motor will infuse the first aid medicine which is already prescribed by the doctor to the critical patients through glucose trip. The sensors, LCD display, GSM module and pump motor are interfaced with the pic microcontroller.

**OBJECTIVES:**

- To understand the methods of biasing transistors
- To design and analyze single stage and multistage amplifier circuits
- To analyze the frequency response of small signal amplifiers
- To design and analyze the regulated DC power supplies.
- To troubleshoot and fault analysis of power supplies.

**UNIT I BIASING OF DISCRETE BJT, JFET AND MOSFET** 9

BJT– Need for biasing - DC Load Line and Bias Point – DC analysis of Transistor circuits - Various biasing methods of BJT – Bias Circuit Design - Thermal stability - Stability factors - Bias compensation techniques using Diode, thermistor and sensistor – Biasing BJT Switching Circuits- JFET - DC Load Line and Bias Point - Various biasing methods of JFET - JFET Bias Circuit Design - MOSFET Biasing - Biasing FET Switching Circuits.

**UNIT II BJT AMPLIFIERS** 9

Small Signal Hybrid  $\pi$  equivalent circuit of BJT – Early effect - Analysis of CE, CC and CB amplifiers using Hybrid  $\pi$  equivalent circuits - AC Load Line Analysis- **Darlington Amplifier** - Bootstrap technique - Cascade, Cascode configurations - Differential amplifier, Basic BJT differential pair – Small signal analysis and CMRR.

**UNIT III SINGLE STAGE FET, MOSFET AMPLIFIERS**

Small Signal Hybrid  $\pi$  equivalent circuit of FET and MOSFET - Analysis of CS, CD and CG amplifiers using Hybrid  $\pi$  equivalent circuits - Basic FET differential pair- BiCMOS circuits.

**UNIT IV FREQUENCY RESPONSE OF AMPLIFIERS** 9

Amplifier frequency response – Frequency response of transistor amplifiers with circuit capacitors  
– BJT frequency response – short circuit current gain - cut off frequency –  $f_{\alpha}$ ,  $f_{\beta}$  and unity gain bandwidth – Miller effect - frequency response of FET - High frequency analysis of CE and MOSFET CS amplifier - Transistor Switching Times.

**UNIT V POWER SUPPLIES AND ELECTRONIC DEVICE TESTING** 9

Linear mode power supply - Rectifiers - Filters - Half-Wave Rectifier Power Supply - Full-Wave Rectifier Power Supply - Voltage regulators: Voltage regulation - Linear series, shunt and switching Voltage Regulators - Over voltage protection - BJT and MOSFET – Switched mode power supply (SMPS) - Power Supply Performance and Testing - Troubleshooting and Fault Analysis, Design of Regulated DC Power Supply.

**TOTAL: 45 PERIODS****OUTCOMES:****After studying this course, the student should be able to:**

- Acquire knowledge of
  - Working principles, characteristics and applications of BJT and FET
  - Frequency response characteristics of BJT and FET amplifiers
- Analyze the performance of small signal BJT and FET amplifiers - single stage and multistage amplifiers
- Apply the knowledge gained in the design of Electronic circuits

**TEXT BOOKS:**

1. Donald. A. Neamen, Electronic Circuits Analysis and Design, 3<sup>rd</sup> Edition, Mc Graw Hill Education (India) Private Ltd., 2010. (Unit I-IV)
2. Robert L. Boylestad and Louis Nasheresky, —Electronic Devices and Circuit Theory, 11<sup>th</sup> Edition, Pearson Education, 2013. (Unit V)

**REFERENCES**

1. Millman J, Halkias.C.and Sathyabrada Jit, Electronic Devices and Circuits, 4<sup>th</sup> Edition, Mc Graw Hill Education (India) Private Ltd., 2015.
2. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4<sup>th</sup> Edition, Mc Graw Hill Education (India) Private Ltd., 2017.
3. Floyd, Electronic Devices, Ninth Edition, Pearson Education, 2012.
4. David A. Bell, Electronic Devices & Circuits, 5<sup>th</sup> Edition, Oxford University Press, 2008.
5. Anwar A. Khan and Kanchan K. Dey, A First Course on Electronics, PHL 2006.

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**OBJECTIVES:**

- To inculcate understanding of the basics required for circuit representation of RF networks.
- To deal with the issues in the design of microwave amplifier.
- To instill knowledge on the properties of various microwave components.
- To deal with the microwave generation and microwave measurement techniques

**UNIT I TWO PORT NETWORK THEORY**

9

Review of Low frequency parameters: Impedance, Admittance, Hybrid and ABCD parameters, Different types of interconnection of Two port networks, High Frequency parameters, Formulation of S parameters, Properties of S parameters, Reciprocal and lossless Network, Transmission matrix, RF behavior of Resistors, Capacitors and Inductors.

**UNIT II RF AMPLIFIERS AND MATCHING NETWORKS**

9

Characteristics of Amplifiers, Amplifier power relations, Stability considerations, Stabilization Methods, Noise Figure, Constant VSWR, Broadband, High power and Multistage Amplifiers, Impedance matching using discrete components, Two component matching Networks, Frequency response and quality factor, T and Pi Matching Networks, Microstrip Line Matching Networks.

**UNIT III PASSIVE AND ACTIVE MICROWAVE DEVICES**

9

Terminations, Attenuators, Phase shifters, Directional couplers, Hybrid Junctions, Power dividers, Circulator, Isolator, Impedance matching devices: Tuning screw, Stub and quarter wave transformers. Crystal and Schottky diode detector and mixers, PIN diode switch, Gunn diode oscillator, IMPATT diode oscillator and amplifier, Varactor diode, Introduction to MIC.

**UNIT IV MICROWAVE GENERATION**

9

Review of conventional vacuum Triodes, Tetrodes and Pentodes, High frequency effects in vacuum Tubes, Theory and application of Two cavity Klystron Amplifier, Reflex Klystron oscillator, **Traveling wave tube amplifier, Magnetron oscillator using Cylindrical**, Linear, Coaxial Voltage tunable Magnetrons, Backward wave Crossed field amplifier and oscillator.

**UNIT V MICROWAVE MEASUREMENTS**

9

Measuring Instruments : Principle of operation and application of VSWR meter, Power meter, Spectrum analyzer, Network analyzer, Measurement of Impedance, Frequency, Power, VSWR, Q- factor, Dielectric constant, Scattering coefficients, Attenuation, S-parameters.

**TOTAL: 45 PERIODS****OUTCOMES:**

**Upon completion of the course, students will be able to:**

- Explain the active & passive microwave devices & components used in Microwave communication systems.
- Analyze the multi-port RF networks and RF transistor amplifiers.
- Generate Microwave signals and design microwave amplifiers.
- Measure and analyze Microwave signal and parameters.

**TEXT BOOKS:**

1. Reinhold Ludwig and Gene Bogdanov, "RF Circuit Design: Theory and Applications", Pearson Education Inc., 2011
2. Robert E Colin, "Foundations for Microwave Engineering", John Wiley & Sons Inc, 2005

**REFERENCES:**

1. David M. Pozar, "Microwave Engineering", Wiley India (P) Ltd, New Delhi, 2008.
2. Thomas H Lee, "Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits", Cambridge University Press, 2004.
3. Mathew M Radmanesh, "RF and Microwave Electronics", Prentice Hall, 2000.
4. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2005.

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**OBJECTIVES:**

- To Facilitate the knowledge about optical fiber sources and transmission techniques
- To Enrich the idea of optical fiber networks algorithm such as SONET/SDH and optical CDMA.
- To Explore the trends of optical fiber measurement systems.

**UNIT I INTRODUCTION TO OPTICAL FIBERS**

9

Evolution of fiber optic system- Element of an Optical Fiber Transmission link-- Total internal reflection-Acceptance angle –Numerical aperture — Skew rays Ray Optics-Optical Fiber Modes and Configurations -Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes -Single Mode Fibers-Graded Index fiber structure.

**UNIT II SIGNAL DEGRADATION OPTICAL FIBERS**

9

Attenuation - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides- Information Capacity determination -Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers- Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling -Design Optimization of SM fibers- RI profile and cut-off wavelength.

**UNIT III FIBER OPTICAL SOURCES AND COUPLING**

9

Direct and indirect Band gap materials-LED structures -Light source materials -Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition -Rate equations  
-External Quantum efficiency -Resonant frequencies -Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fiber -to- Fiber joints, Fiber splicing-Signal to Noise ratio , Detector response time.

**UNIT IV FIBER OPTIC RECEIVER AND MEASUREMENTS**

9

Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration– Probability of Error – Quantum limit.Fiber Attenuation measurements- Dispersion measurements – Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements – Fiber diameter measurements.

**UNIT V OPTICAL NETWORKS AND SYSTEM TRANSMISSION**

9

Basic Networks – SONET / SDH – Broadcast – and –select WDM Networks –Wavelength Routed Networks – Non linear effects on Network performance –Link Power budget -Rise time budget- Noise Effects on System Performance-Operational Principles of WDM Performance of WDM + EDFA system – Solutions – Optical CDMA – Ultra High Capacity Networks.

**TOTAL: 45 PERIODS****OUTCOMES:****Upon completion of the course, students will be able to:**

- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.

**TEXT BOOKS:**

1. Gerd Keiser, "Optical Fiber Communication" Mc Graw -Hill International, 4<sup>th</sup> Edition., 2010.
2. John M. Senior, "Optical Fiber Communication", Second Edition, Pearson Education, 2007.

**REFERENCES:**

1. Ramaswami, Sivarajan and Sasaki "Optical Networks", Morgan Kaufmann, 2009.
2. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 3<sup>rd</sup> Edition, 2008.
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001

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**OBJECTIVES:**

The student should be made to:

- Learn digital image fundamentals.
- Be exposed to simple image processing techniques.
- Be familiar with image compression and segmentation techniques.
- Learn to represent image in form of features.

**UNIT I DIGITAL IMAGE FUNDAMENTALS**

8

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

**UNIT II IMAGE ENHANCEMENT**

10

**Spatial Domain:** Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – **Frequency Domain:** Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

**UNIT III IMAGE RESTORATION AND SEGMENTATION**

9

**Noise models** – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering **Segmentation:** Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.

**UNIT IV WAVELETS AND IMAGE COMPRESSION**

9

Wavelets – Subband coding - Multiresolution expansions - **Compression:** Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – **Lossless Predictive Coding** – Lossy Compression – Lossy Predictive Coding – Compression Standards.

**UNIT V IMAGE REPRESENTATION AND RECOGNITION**

9

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

**TOTAL: 45 PERIODS****OUTCOMES:**

Upon successful completion of this course, students will be able to:

- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

**TEXT BOOK:**

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

**REFERENCES:**

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2. Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
3. William K Pratt, "Digital Image Processing", John Willey, 2002.
4. Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.
5. <http://eeweb.poly.edu/~onur/lectures/lectures.html>  
<http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html>

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**OBJECTIVES:**

The student should be made to:

- Understand the micro-architectural design of processors
- Learn about the various techniques used to obtain performance improvement and powersavings in current processors

**UNIT I FUNDAMENTALS OF COMPUTER DESIGN**

9

Review of Fundamentals of CPU, Memory and IO – Trends in technology, power, energy and cost, Dependability - Performance Evaluation

**UNIT II INSTRUCTION LEVEL PARALLELISM**

9

ILP concepts – Pipelining overview - Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling – Multiple instruction Issue – Hardware Based Speculation – Static scheduling - Multi-threading - Limitations of ILP – Case Studies.

**UNIT III DATA-LEVEL PARALLELISM**

9

Vector architecture – SIMD extensions – Graphics Processing units – Loop level parallelism.

**UNIT IV THREAD LEVEL PARALLELISM**

9

Symmetric and Distributed Shared Memory Architectures – Performance Issues – Synchronization – Models of Memory Consistency – Case studies: Intel i7 Processor, SMT & CMP Processors

**UNIT V MEMORY AND I/O**

9

Cache Performance – Reducing Cache Miss Penalty and Miss Rate – Reducing Hit Time – Main Memory and Performance – Memory Technology. Types of Storage Devices – Buses – RAID – Reliability, Availability and Dependability – I/O Performance Measures.

**TOTAL: 45 PERIODS****OUTCOMES:**

At the end of the course, the student should be able to:

- Evaluate performance of different architectures with respect to various parameters
- Analyze performance of different ILP techniques
- Identify cache and memory related issues in multi-processors

**TEXT BOOK:**

I. John L Hennessey and David A Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/ Elsevier, Fifth Edition, 2012.

**REFERENCES:**

1. Kai Hwang and Faye Briggs, "Computer Architecture and Parallel Processing", Mc Graw-Hill International Edition, 2000.
2. Sima D, Fountain T and Kacsuk P, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 2000.

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**OBJECTIVES:**

- To understand the basics of solid state physics.
- To understand the basics of display devices.
- To understand the optical detection devices.
- To understand the design of optoelectronic integrated circuits.

**UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS**

9

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

**UNIT II DISPLAY DEVICES AND LASERS**

9

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

**UNIT III OPTICAL DETECTION DEVICES**

9

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

**UNIT IV OPTOELECTRONIC MODULATOR**

9

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

**UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS**

9

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

**TOTAL: 45 PERIODS****OUTCOMES:**

Upon Completion of the course, the students will be able to

- To design display devices.
- To design optoelectronic detection devices and modulators.
- To design optoelectronic integrated circuits.

**TEXTBOOKS:**

1. Pallab Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, "Opto Electronics – As Introduction to Materials and Devices", Mc Graw-Hill International Edition, 1998

**REFERENCES:**

1. S C Gupta, Opto Electronic Devices and Systems, Prentice Hal of India, 2005.
2. J. Wilson and J.Haukes, "Opto Electronics – An Introduction", Prentice Hall, 1995

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**OBJECTIVES:****The student should be made to:**

- Know the characteristic of wireless channel
- Learn the various cellular architectures
- Understand the concepts behind various digital signaling schemes for fading channels
- Be familiar the various multipath mitigation techniques
- Understand the various multiple antenna systems

**UNIT I WIRELESS CHANNELS**

9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design –Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters- Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

**UNIT II CELLULAR ARCHITECTURE**

9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement

**UNIT III DIGITAL SIGNALING FOR FADING CHANNELS**

9

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle –Cyclic prefix, Windowing, PAPR.

**UNIT IV MULTIPATH MITIGATION TECHNIQUES**

9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver,

**UNIT V MULTIPLE ANTENNA TECHNIQUES**

9

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity-Channel state information-capacity in fading and non-fading channels.

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the student should be able to:**

- Characterize wireless channels
- Design and implement various signaling schemes for fading channels
- Design a cellular system
- Compare multipath mitigation techniques and analyze their performance
- Design and implement systems with transmit/receive diversity and MIMO systems and analyze their performance

**TEXTBOOKS:**

1. Rappaport, T.S., “Wireless communications”, Second Edition, Pearson Education, 2010.
2. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

**REFERENCES:**

1. David Tse and Pramod Viswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
2. Upena Dalal, “Wireless Communication”, Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, “OFDM for wireless multimedia communications”, ArtechHouse, 2000.

*Green*

**PRINCIPAL**

Chinnasa Engineering College for Women  
Vaidyanathan Road, CHINNASA  
Kallakurichi Taluk, Villupuram District  
TAMIL NADU

**OBJECTIVES:**

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

**UNIT I WIRELESS LAN**

9

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

**UNIT II MOBILE NETWORK LAYER**

9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Network layer in the internet-Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

**UNIT III MOBILE TRANSPORT LAYER**

9

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

**UNIT IV WIRELESS WIDE AREA NETWORK**

9

Overview of UMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G- SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

**UNIT V 4G NETWORKS**

9

Introduction — 4G vision — 4G features and challenges - Applications of 4G — 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

**TOTAL: 45 PERIODS****OUTCOMES:****Upon completion of the course, the students will be able to**

- Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- Design and implement wireless network environment for any application using latest wireless protocols and standards.
- Implement different type of applications for smart phones and mobile devices with latest network strategies.

**TEXT BOOKS:**

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit I,II,III)
2. Vijay Garg, "Wireless Communications and networking", First Edition, Elsevier 2007.(Unit IV,V)

**REFERENCES:**

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin, Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013


  
PRINCIPAL

idhaya Engineering College for Women  
Nainarpalaym Road, CHINNASALEM-60526  
Kallakurichi Taluk, Villupuram District



# NEXGEN TECHNOLOGY

No: 66, 4th Cross, Venkata Nagar,  
Near SBI ATM, Puducherry.

## CERTIFICATE OF PARTICIPATION

This is to certify that ..... **A. ANITHA** .....

has done inplant training in ..... **EMBEDDED...SYSTEM**..... from

..18.06.2012..... to ..20.06.2012..

*Princip*  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.

During the training period the performance of the trainee

was found to be ..... **GOOD** .....

*W. S. S.*  
Technical Head

*B. S. S.*  
Director



# NEXGEN TECHNOLOGY

No: 66, 4th Cross, Venkata Nagar,  
Near SBI ATM, Puducherry.

## CERTIFICATE OF PARTICIPATION

This is to certify that ..... **P. KAYAL VIZHI** .....

has done inplant training in ...**EMBEDDED... SYSTEM**..... from

...**18.06.2018**... to ..**20.06.2018**

*Bruce*  
**Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

During the training period the performance of the trainee

was found to be ..... **GOOD** .....

*Aditya*  
**Technical Head**

*[Signature]*  
**Director**





# NEXGEN TECHNOLOGY

No: 66, 4th Cross, Venkata Nagar,  
Near SBI ATM, Puducherry.

## CERTIFICATE OF PARTICIPATION

This is to certify that ..... **K:RAMYA** .....

has done inplant training in ...**EMBEDDED...SYSTEM**..... from

...**18.06.2018**..... to ...**20.06.2018**

*Principi*  
**Dr.R.GURUMANI**,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.

During the training period the performance of the trainee  
was found to be ..... **GOOD** .....

*Wahy*  
**Technical Head**

*Director*  
**Director**



# NEXGEN TECHNOLOGY

No: 66, 4th Cross, Venkata Nagar,  
Near SBI ATM, Puducherry.

## CERTIFICATE OF PARTICIPATION

This is to certify that ..... R. NAGIA DHARSHINI .....

has done inplant training in ..... EMBEDDED SYSTEM ..... from

..... 18.06.2012 ..... to ..... 20.06.2012 .....

*new*  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHI DT.

During the training period the performance of the trainee  
was found to be ..... GOOD .....

*W. Jay*  
Technical Head


*[Signature]*  
Director



An ISO 9001 : 2008 Certified Company

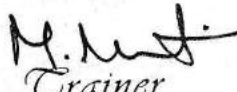
## Certificate of Internship

This is to certify that ~~Mr./Mrs./Miss~~ ..... **SUPRAJA.M** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from **18-06-2018** ..... to **22-06-2018** .....  
During the training the performance of the intern was found to be ..... **GOOD** .....

  
Project Co-ordinator



  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.


  
Trainer



An ISO 9001 : 2008 Certified Company

## Certificate of Internship

This is to certify that Mr/Mrs/Miss ..... **KAVYA.V** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from **18-06-2018** to **22-06-2018**.  
During the training the performance of the intern was found to be **GOOD** .....

  
Project Co-ordinator



*R. Guramani*  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.

  
Trainer




An ISO 9001 : 2008 Certified Company

## Certificate of Internship

This is to certify that Mr/Mrs/Miss ..... **GOLDA REMINA MARY A** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from ...18-06-2018... to ...22-06-2018...  
During the training the performance of the intern was found to be ..... **Good** .....

  
Project Co-ordinator



  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI

  
Trainer



An ISO 9001 : 2008 Certified Company

## Certificate of Internship

This is to certify that ~~Mr/Mrs/Miss~~ ..... **JEEVA SURUTHI : A** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from **18-06-2018** ..... to **29-06-2018** .....  
During the training the performance of the intern was found to be ..... **GOOD** .....

  
Project Co-ordinator



*Heena*  
Dr.R.GURUMANI, M.E., Ph.D., M.B.A., MISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.


  
Trainer



An ISO 9001 : 2008 Certified Company

## Certificate of Internship

This is to certify that ~~Mr/Mrs/Miss~~ ..... **NAGALAKSHMI.M** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from **18-06-2018** ..... to **22-06-2018** .....  
During the training the performance of the intern was found to be **GOOD** .....

  
Project Co-ordinator



*neeni*  
Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.

  
Trainer



An ISO 9001 : 2008 Certified Company

## Certificate of Internship

This is to certify that ~~Mr/Mrs/Miss~~ ..... **SANGEETHA . K.S** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from **18-06-2018** to **22-06-2018** ..  
During the training the performance of the intern was found to be **GOOD** .....

  
Project Co-ordinator



  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.

  
Trainer





An ISO 9001 : 2008 Certified Company

## Certificate of Internship

This is to certify that Mr/Mrs/Miss ..... **SOPHIA MARY R** .....  
has undergone **EMBEDDED SYSTEMS** internship in our company from **18-06-2018** to **22-06-2018**.  
During the training the performance of the intern was found to be **Good**.

  
Project Co-ordinator

TECHNOLOGIES

*Ramani*  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.

  
Trainer

# SANDS®

## INTERNSHIP CERTIFICATE

TO WHOMSOEVER IT MAY CONCERN

Certificate No : 059

Date: 08.06.2018

This is to certify that Mr/Ms. G. MERLIN JOYANA bearing  
Internship ID No 282/18-19/ARM/089 has successfully completed Internship on  
Embedded System & IoT Using Cortex M0+ Core during the period  
from 04.06.2018 To 08.06.2018

S. Santosh Kumar

**S. SANTOSH KUMAR**

Head - Training & Development

*Praveen*  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.I.S.T.E., F.I.E.  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
606 201, KALLAKURICHI DT.

P. Karthik Venkatesh

**P. KARTHIK VENKATESH**

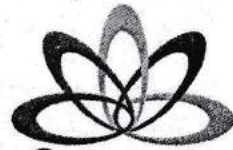
Head - Embedded Solutions

Signals & Systems (India) Private Limited

15/D-19, Third Main Road, SIPCOT IT Park, Siruseri, OMR, Chennai-603103

Tel : 044-27470001 / 27470003, Email: training@sandsindia.com

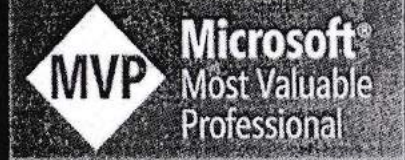
www.sandscerebro.com // www.sandsindia.com



# KaaShiv InfoTech

SOFTWARE DEVELOPMENT & ELECTRONICS / IOT RESEARCH COMPANY

X-41, shivanantha Building, 5th Floor, 2nd Avenue, Anna Nagar, Chennai - 40  
www.kaashivinfotech.com



ORACLE

Certified Expert

## Certificate of Completion

Mr./Ms. E. SUBASHINI

a Student of IDHAYA ENGINEERING COLLEGE FOR WOMEN

has done his/her In-Plant Training in Our Company held from 20-06-2018

to 24-06-2018 and completed the Training Successfully.

J. VENKATESAN PRABU  
Managing Director

KAASHIV INFOTECH  
X 41, Shivanantha Building  
5th Floor, 2nd Avenue  
Anna Nagar, Chennai-600 04C  
Ph: 044-42057547

*Heaven*  
Dr.R.GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN,  
CHINNASALEM-606 201, KALAKURICH D.

  
J. ARUNACHALAM  
Project Manager

**OBJECTIVES:**

- To introduce the concept of Internet, Networks and its working principles.
- To know scripting languages.
- To understand various applications related to Information Technology.

**UNIT I WEB ESSENTIALS**

9

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server

**UNIT II SCRIPTING ESSENTIALS**

9

Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators — Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts

**UNIT III NETWORKING ESSENTIALS**

9

Fundamental computer network concepts - Types of computer networks - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

**UNIT IV MOBILE COMMUNICATION ESSENTIALS**

9

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture - Voice calls & SMS

**UNIT V APPLICATION ESSENTIALS**

9

Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

**TOTAL: 45 PERIODS****OUTCOMES:****On Completion of the course, the students should be able to:**

- Design and deploy web-sites
- Design and deploy simple web-applications
- Create simple database applications
- Develop information system
- Describe the basics of networking and mobile communications

**TEXT BOOKS:**

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
2. James F. Kurose, —Computer Networking: A Top-Down Approach, Sixth Edition, Pearson, 2012.

**REFERENCES:**

1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
2. R. Kelly Rainer, Casey G. Cegielski, Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
3. it-ebooks.org

*R. G. R.*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.JE.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201, KALLAKURICHI DT.**

**OBJECTIVES:****The student should be made to:**

- Understand the technologies used in Web Programming.
- Know the importance of object oriented aspects of Scripting.
- Understand creating database connectivity using JDBC.
- Learn the concepts of web based application using sockets.

**UNIT I SCRIPTING.**

9

Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script- Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML5- CSS3- HTML 5 canvas - Web site creation using tools.

**UNIT II JAVA**

9

Introduction to object oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/Output – Files – Utility Classes – String Handling.

**UNIT III JDBC**

9

JDBC Overview – JDBC implementation – **Connection class – Statements** - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets - UDP sockets, Java Beans –RMI.

**UNIT IV APPLETS**

9

Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

**UNIT V XML AND WEB SERVICES**

9

Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI-WSDL-Java web services – Web resources.

**TOTAL (L:45+T:15): 60 PERIODS****OUTCOMES:****Upon Completion of the course, the students will be able to**

- Design web pages.
- Use technologies of Web Programming.
- Apply object oriented aspects to Scripting.
- Create databases with connectivity using JDBC.
- Build web based application using sockets.

**TEXT BOOKS:**

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5<sup>th</sup> Edition.
2. Herbert Schildt, Java - The Complete Reference, 7<sup>th</sup> Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

**REFERENCES:**

1. John Pollock, Javascript - A Beginners Guide, 3<sup>rd</sup> Edition – Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.


  
PRINCIPAL

Idhaya Engineering College for Women  
Nainarpalaym Road, CHINNASALEM-60621  
Kallakurichi Taluk, Villupuram District

**Selva Nayagam <selvairt@gmail.com>** Tue, Feb 12, 1:55 PM (3 days ago)

to me

Respected Sir,

This is the acceptance letter which we are sending on behalf of students of **IDAYA ENGINEERING COLLEGE of CSE and IT Students (2<sup>nd</sup> year and 3<sup>rd</sup> year)** and we are sending this acceptance letter for our academic purposes. We are pleased that you and your students are interested in touring our Industrial Visit to learn more about us and the Research and Development Industry. I would like to schedule a day and time that are mutually agreeable for the Research and Development Industry Training on the coming 16<sup>th</sup> of Saturday. We hope to make this experience one that will be useful to you and your students to help educate them regarding what our company Developed and gain a better understanding of the Research and Development Industry.

With Best Regards,

**Mr. S. SELVANAYAGAM**  
**CHIEF EXECUTIVE OFFICER**  
**IMMACULATE TECHNOLOGIES**

  
**Dr.R.GURUMANI**,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.I.E.  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT**



## IMMACULATE TECHNOLOGIES

### **IDHAYA ENGINEERING COLLEGE FOR WOMEN (IECW)**

Nainnarpalayam Road,  
Chinnasalem,  
Tamil Nadu 606201

Dear Sir,

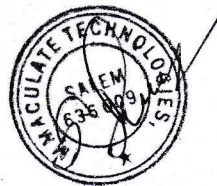
Thank you for taking the time to visit our Immaculate Technologies. This is the thanking letter which we are sending on behalf of students of **IDAYA ENGINEERING COLLEGE of CSE - 2<sup>nd</sup> year and 3<sup>rd</sup> year** on Saturday (16/02/2019). We hope that the visit helped to make clear experience one that will be useful to you and your students to help educate them regarding what our company Developed and gain a better understanding of the Research and Development Industry. Thank you for providing me such opportunity to behalf with you.

Thank you again for sharing your valuable time with us.

Sincerely,

**Mr. S. SELVANAYAGAM**  
**CHIEF EXECUTIVE OFFICER**  
**IMMACULATE TECHNOLOGIES**

No.476, Anna Street,  
Angammal Colony,  
New Bus Stand Back Side,  
Salem-9.



*R. Guramani*  
**Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,**  
**PRINCIPAL**  
**IDHAYA ENGG. COLLEGE FOR WOMEN**  
**CHINNASALEM-606 201. KALLAKURICHI DT.**

Ref: YAS/INV/2019/001

Date:16/02/2019

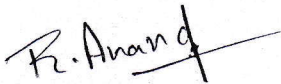
### INDUSTRIAL VISIT CERTIFICATE

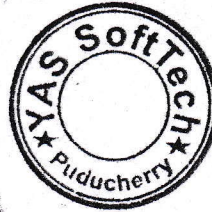
This is to certified that Final year B.E CSE and B.Tech IT students of Idhaya Engineering College For Women, Chinnasalem, has visited our company as Industrial Visit Program and successfully participated and gained knowledge about technologies that we are using in project development during **February 16<sup>th</sup>, 2019.**

During the period of visit, Students shown great amount of responsibility, sincerity and genuine willingness to learn and zeal to learn new technology and challenges.

We wish them all the best for future.

With regards,

  
Anandkrishnan.R  
Managing Director



  
Dr. R. GURUMANI, M.E., Ph.D., M.B.A., M.ISTE., F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201, KALLAKURICHI DT.



## Plant visit-Requisition Letter

**Jai sundar <chisundar123@gmail.com>** Tue, Feb 12, 12:00 PM (3 days ago)

to contact

Dear Sir/Mam,

We are seeking your permission to visit your development center for Final year CSE and IT students on 16.2.19.of total strength 65 students.Kindly accept our request and send me the confirmation.

Regards,  
Dr.S.Jayasundar,  
HoD/CSE,  
Idhaya Engineering College For Women,  
Chinnasalem.  
Contact No 9500977484

**contact@yassofttech.com** Tue, Feb 12, 2:25 PM (3 days ago)

to me

Dear Sir,

With reference to your mail, we are glad to give permission to your final year students to visit our Company on 16.02.2019 (Saturday).

Time Allocated: 9:00 AM to 11:00 AM  
Maximum 25 students for batch can accommodated.  
Each batch maximum 15 mins will be allocated.

With Regards,  
Managing Director  
YAS SoftTech

Thank you for your response.  
Thanks a lot.  
Thank you for the information.

*Mani*  
**Dr.R.GURUMANI**,M.E.,Ph.D.,M.B.A.,M.ISTE.,F.I.E.,  
PRINCIPAL  
IDHAYA ENGG. COLLEGE FOR WOMEN  
CHINNASALEM-606 201. KALLAKURICHURU

**OBJECTIVES:**

The students should be made to be

- Learn M2M developments and satellite applications
- Understand Satellite Communication In Ipv6 Environment

**UNIT I OVERVIEW OF SATELLITE COMMUNICATION**

9

Overview of satellite communication and orbital mechanics Link budget Parameters, Link budget calculations, Auxiliary Equations, Performance Calculations.

**UNIT II M2M DEVELOPMENTS AND SATELLITE APPLICATIONS**

9

Overview of the Internet of Things and M2M- M2M Applications Examples and Satellite Support- Satellite Roles Context and Applications- Antennas for Satellite M2M Applications- M2M Market Opportunities for Satellite Operators- Ultra HD Video/TV and Satellite Implications- High Throughput Satellites (HTS) and **Ka/Ku Spot Beam Technologies**- Aeronautical, Maritime and other Mobility Services.

**UNIT III SATELLITE COMMUNICATION IN IPV6 ENVIRONMENT**

9

Overview of IPv6 and its benefits for Satellite Networks - Migration and Coexistence--Implementation scenarios and support- Preparations for IPv6 in Satellite communication- Satellite specific Protocol issues in IPv6 — Impact of IPv6 on Satellite Network architecture and services-Detailed transitional plan- IPv6 demonstration over satellites - Key results and recommendations.

**UNIT IV SATELLITE NAVIGATION AND GLOBAL POSITIONING SYSTEM**

9

Over view of Radio and Satellite Navigation, GPS Principles, Signal model and Codes, Satellite Signal Acquisition, Mathematical model of GPS observables, Methods of processing GPS data , GPS Receiver Operation and Differential GPS. IRNSS, GAGAN, GLONASS and Galileo.

**UNIT V DEEP SPACE NETWORKS AND INTER PLANETARY MISSIONS**

9

Introduction — Functional description - Design procedure and performance criterion-Mars exploration Rover- Mission and space craft summary-Telecommunication subsystem overview-Ground Subsystem-Telecom subsystem and Link performance Telecom subsystem Hardware and software Chandrayaan-1 Mission - Mission and space craft summary-Telecommunication subsystem overview- Ground Subsystem-Telecom subsystem and Link performance. Mangalyaan Mission - Mission and space craft summary-Telecommunication subsystem overview- Ground Subsystem-Telecom subsystem and Link performance.

**OUTCOMES:**

At the end of this course, the student should be able to:

- Discuss satellite navigation and global positioning system
- Outline deep space networks and inter planetary missions

**REFERENCES:**

1. Adimurthy.V," Concept design and planning of India's first interplanetary mission" CurrentScience, VOL. 109, NO. 6, 1054 25 SEPTEMBER 2015.
2. Anil K. Maini, Varsha Agrawal, 'Satellite Technology: Principles and Applications', Third Edition,Wiley, 2014.
3. Daniel Minoli' "Innovations in Satellite Communication and Satellite Technology" Wiley, 2015
4. Daniel Minoli, "Satellite Systems Engineering in an IPv6 Environment", CRC Press, FirstEdition, 2009.
5. Hofmann-Wellenhof B., Lichtenegger H., and Elmar Wasle, "Global Navigational Satellite Systems" Springer-Verlag, 2008.
6. Jim Taylor, " Deep Space Communications" John Wiley & Sons, 2016.
7. Louis J. Ippolito, Jr. "Satellite Communications Systems Engineering: Atmospheric Effects,Satellite Link Design and System Performance", Second Edition, 2017
8. <http://www.isro.gov.in/pslv-c25-mars-orbiter-mission>
9. [https://en.wikipedia.org/wiki/Mars\\_Orbiter\\_Mission](https://en.wikipedia.org/wiki/Mars_Orbiter_Mission)
10. <https://en.wikipedia.org/wiki/Chandrayaan-1>

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**OBJECTIVES:**

- To understand the basics of signal-space analysis and digital transmission.
- To understand the coherent and noncoherent receivers and its impact on different channel characteristics.
- To understand the different Equalizers
- To understand the different block coded and convolutional coded digital communications systems.
- To understand the basics of Multicarrier and Multiuser Communications.

**UNIT I COHERENT AND NON-COHERENT COMMUNICATION 9**

Coherent receivers – Optimum receivers in WGN – IQ modulation & demodulation – Noncoherent receivers in random phase channels; MFSK receivers – Rayleigh and Rician channels – Partially coherent receivers – DPSK; M-PSK; M-DPSK-BER Performance Analysis. Carrier Synchronization-Bit synchronization.

**UNIT II EQUALIZATION TECHNIQUES 9**

Band Limited Channels- ISI – Nyquist Criterion- Controlled ISI-Partial Response signals- Equalization algorithms – Viterbi Algorithm – Linear equalizer – Decision feedback equalization – Adaptive Equalization algorithms.

**UNIT III BLOCK CODED DIGITAL COMMUNICATION 9**

Architecture and performance — Binary block codes; Orthogonal; Biorthogonal; Transorthogonal — Shannon's channel coding theorem; Channel capacity; Matched filter; **Concepts of Spread spectrum communication** — Coded BPSK and DPSK demodulators— Linear block codes; Hamming; Golay; Cyclic; BCH; Reed – Solomon codes. Space time block codes.

**UNIT IV CONVOLUTIONAL CODED DIGITAL COMMUNICATION 9**

Representation of codes using Polynomial, State diagram, Tree diagram, and Trellis diagram —Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold methods  
– Error probability performance for BPSK and Viterbi algorithm, Turbo Coding.

**UNIT V MULTICARRIER AND MULTIUSER COMMUNICATIONS 9**

Single Vs multicarrier modulation, orthogonal frequency division multiplexing (OFDM), Modulation and demodulation in an OFDM system, An FFT algorithmic implementation of an OFDM system, Bit and power allocation in multicarrier modulation, Peak-to-average ratio in multicarrier modulation. Introduction to CDMA systems, multiuser detection in CDMA systems — optimum multiuser receiver, suboptimum detectors, successive interference cancellation.

**TOTAL : 45 PERIODS**

**OUTCOMES:****Upon Completion of the course, the students will be able to:**

- Develop the ability to understand the concepts of signal space analysis for coherent and non-coherent receivers.
- Conceptually appreciate different Equalization techniques
- Possess knowledge on different block codes and convolutional codes.
- Comprehend the generation of OFDM signals and the techniques of multiuser detection.

**REFERENCES:**

1. Bernard Sklar, "Digital Communications", second edition, Pearson Education, 2001.
2. John G. Proakis, "Digital Communication", Fifth Edition, Mc Graw Hill Publication, 2008.
3. M.K.Simon, S.M.Hinedi and W.C.Lindsey, "Digital communication techniques; Signal Design and Detection", Prentice Hall of India, New Delhi, 1995.
4. Richard Van Nee & Ramjee Prasad, "OFDM for Multimedia Communications" Artech House Publication, 2001.
5. Stephen G. Wilson, "Digital Modulation and Coding", First Indian Reprint, Pearson Education, 2003.
6. Simon Haykin, "Digital communications", John Wiley and sons, 1993.

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**OBJECTIVES:**

- To give fundamental concepts related to broadband access technologies.
- To understand the current and emerging wired and wireless access technologies.
- To acquire knowledge about cable modems and fiber access technologies.
- To have an exposure to different systems standards for next generation broadband access networks.

**UNIT I REVIEW OF ACCESS TECHNOLOGIES 5**  
Phone-Line modem, cable-access, ISDN, Emerging Broad band Technologies, Cable DSL, Fiber and Wireless, Standards for access network.

**UNIT II DIGITAL SUBSCRIBER LINES 10**  
Asymmetric Digital subscriber lines (ADSL) — Rate Adaptive subscriber line (RADSL)-ISDN Digital subscriber line (IDSL) - High bit rate DSL (HDSL)-Single line DSL (SDSL) - very high bit rate DSL (VDSL) - Standards for XDSL & Comparison.

**UNIT III CABLE MODEM 10**  
Cable Modem, DOCSIS – Physical Cabling, Dual Modem Operation, Hub Restriction, Upstream Operation – Downstream operation – Access control – framing Security sub layer – Data link layer – LLC & Higher layers – ATM centric VS IP – centric cable modem.

**UNIT IV FIBER ACCESS TECHNOLOGIES 10**  
Optical Fiber in access networks, **Architecture and Technologies**- Hybrid fiber — Coax (HFC) system, Switched Digital Video (SDV) – Passive optical networks (PON) – FTTX (FTTH, FTTB, FTTC, FTT cab) comparison, Broadband PON , Gigabit-Capable PON.

**UNIT V BROAD BAND WIRELESS 10**  
Fixed Wireless, Direct Broadcast Satellite (DBS), Multi channel multi point distribution services (MMDS), Local multi point distribution services (LMDS), and Wideband integrated Digital Interactive Services (WIDIS), Mobile Wireless 3G — IMT 2000, Introduction to LTE-A.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

- To able to design systems meeting out the requirements of the recent standards.
- To meet out the industry requirements for man power in next generation networks.
- To be able to contribute towards the enhancement of the existing wireless technologies.

**REFERENCES:**

1. Dennis J. Rauschmayer, "ADSL/VDSL Principles: A Practical and Precise Study of Asymmetric Digital Subscriber Lines and Very High Speed Digital Subscriber Lines", Macmillan Technology Series, 1998.
2. Gilbert Held, "Next Generation Modems: A Professional Guide to DSL and Cable Modems", John Wiley & Sons, 2000.
3. Leonid G. Kazovsky, Ning Cheng, Wei-Tao Shaw, David Gutierrez, Shing-Wa Wong, "Broadband Optical Access Networks", John Wiley and Sons, New Jersey, 2011.
4. Martin P. Clarke, "Wireless Access Network: Fixed Wireless Access and WLL Network Design and Operation", John Wiley & Sons 2000.
5. Niel Ransom and Albert A. Azzam, "Broadband Access Technologies: ADSL, VDSL Cable Modem, Fiber and LMDS", McGraw Hill, 1999.
6. Sassan Ahmadi, "LTE-Advanced – A practical systems approach to understanding the 3GPP LTE Releases 10 and 11 radio access technologies", Elsevier, 2014.
7. Walter J Woralski, "ADSL and DSL Technologies", McGraw Hill Computer Communication Series, Second Edition Oct 2001.
8. William Webb, "Introduction to Wireless Local Loop Broadband and Narrow Band System", Mobile Communication Series, Artech House Publishers, Second Edition 2000.

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**OBJECTIVES:**

- To understand the image fundamentals.
- To understand the various image segmentation techniques.
- To extract features for image analysis.
- To introduce the concepts of image registration and image fusion.
- To illustrate 3D image visualization.

**UNIT I FUNDAMENTALS OF DIGITAL IMAGE PROCESSING**

9

Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, 2D image transforms-DFT, DCT, KLT,SVD. Image enhancement in spatial and frequency domain, Review of Morphological image processing.

**UNIT II SEGMENTATION**

9

Edge detection, Thresholding, Region growing, Fuzzy clustering, Watershed algorithm, Active contour models, Texture feature based segmentation, Graph based segmentation, Wavelet based Segmentation - Applications of image segmentation.

**UNIT III FEATURE EXTRACTION**

9

First and second order edge detection operators, Phase congruency, Localized feature extraction - detecting image curvature, shape features, Hough transform, shape skeletonization, **Boundary descriptors, Moments,** Texture descriptors- Autocorrelation, Co-occurrence features, Runlength features, Fractal model based features, Gabor filter, wavelet features.

**UNIT IV REGISTRATION AND IMAGE FUSION**

9

Registration - Preprocessing, Feature selection - points, lines, regions and templates Feature correspondence - Point pattern matching, Line matching, Region matching, Template matching. Transformation functions - Similarity transformation and Affine Transformation. Resampling — Nearest Neighbour and Cubic Splines. Image Fusion - Overview of image fusion, pixel fusion, wavelet based fusion -region based fusion.

**UNIT V 3D IMAGE VISUALIZATION**

9

Sources of 3D Data sets, Slicing the Data set, Arbitrary section planes, The use of color, Volumetric display, Stereo Viewing, Ray tracing, Reflection, Surfaces, Multiple connected surfaces, Image processing in 3D, Measurements on 3D images.

**TOTAL: 45 PERIODS****OUTCOMES:**

**Upon Completion of the course, the students will be able to**

- Explain the fundamentals digital image processing.
- Describe image various segmentation and feature extraction techniques for image analysis.
- Discuss the concepts of image registration and fusion.
- Explain 3D image visualization.

**REFERENCES:**

1. Ardeshir Goshtasby, "2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications", John Wiley and Sons, 2005.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.
3. John C. Russ, "The Image Processing Handbook", CRC Press, 2007.
4. Mark Nixon, Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.
5. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Education, Inc., Second Edition, 2004.
6. Rick S. Blum, Zheng Liu, "Multisensor image fusion and its Applications", Taylor & Francis, 2006.

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**OBJECTIVES :**

The students should be made to:

- Understand the need and concept of security
- Learn cryptosystems

**UNIT I INTRODUCTION AND NUMBER THEORY**

9

Introduction to Information Security, Computer Security & Network Security. Need For Security. Security — Goals, Attacks, Security Services and Mechanisms, and Techniques. Number Theory and Mathematics for Symmetric Cryptography- Finite Arithmetic, Congruence Arithmetic-Linear Congruence and Quadratic Congruence. Mathematics for Asymmetric-Key Cryptography: Fermat's Theorem and Euler's Theorem, Primes, Primality Testing, Factorization, CRT, Exponentiation. Classical Symmetric-Key Ciphers –Substitution Ciphers, Transposition Ciphers.

**UNIT II SYMMETRIC AND ASYMMETRIC CRYPTOSYSTEMS**

9

Modern Symmetric-Key Cipher - Block Ciphers (DES, 3DES, AES and its mode of operations), Stream Ciphers, Asymmetric-Key Cryptosystem- RSA, ElGamal, ECC, Key Management - Diffie- Hellman (DH) Mechanism, Kerberos — Needham Schroeder Protocol.

**UNIT III AUTHENTICATION, DIGITAL SIGNATURES AND CERTIFICATES**

9

Message Integrity & Message Authentication - Message Authentication Code (MAC), Cryptographic Hash Functions — Birthday Attacks, Digital Signatures - **Digital Signature Standards** (FIPS 186-2), DSA (ANSI X9.30), RSA (ANSI X9.31) – Public Key Distribution – RSA schemes, Digital Certificates - PKI Certificates, PKI Life Cycle Management.

**UNIT IV TRUSTED IDENTITY**

9

Entity Authentication: Password System- Fixed and One time Passwords (S/Key) RFC 2289 – Callback Systems, Zero Knowledge, Challenge and Response Systems – RADIUS — ITU-T X.509.

**UNIT V SECURITY AT LAYERS**

9

Network Layer Security - IPSec, Transport Layer Security- SSL/TLS, SSH, Application Layer Security –PGP, S/MIME, Firewall - Concepts, Architecture, Packet Filtering, Proxy Services and Bastion Hosts.

**TOTAL: 45 PERIODS****OUTCOMES:**

At the end of this course, the students should be able to:

- Explain digital signature standards
- Discuss authentication
- Explain security at different layers

**REFERENCES:**

1. Behrouz A.Forouzan, "Cryptography and Network Security", Special Edition, Tata McGraw Hill,2007.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons, 1994.
3. Charlie Kaufmann, Radia Perlman, Mike Speciner, "Network Security", Second Edition, PrenticeHall, 2002
4. Douglas R.Stinson, "Cryptography: Theory and Practice", CRC Press Series on DiscreteMathematics and its Applications, 1995.
5. David M. Durton, "Elementary Number Theory", Tata McGraw Hill, Sixth Edition, 2009.
6. William Stallings "Cryptography and Network Security: Principles and Practice", 3rd Edition,Pearson Education, 2002.
7. William Stallings "Network Security Essentials: Applications and Standards", 2nd Edition,

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**OBJECTIVES:**

The students should be made to understand:

- Optical system components like optical amplifiers, wavelength converters.
- Up-to-date survey of development in Optical Network Architectures.
- Packet switching.
- Network design perspectives.
- Different Optical Network management techniques and functions.

**UNIT I**

9

Introduction to Optical Networks: Telecommunications Networks Architecture, Services, circuit switching and packet switching, Optical Networks: Multiplexing Techniques, Second generation Optical Networks, Optical Packet Switching, Transmission Basics: Wavelength, frequencies, and channel spacing, Wavelength standards, Optical power and loss, Network Evolution, Nonlinear Effects: Self-phase Modulation, Cross-phase Modulation, Four Wave mixing, Solitons. Components: Couplers, Isolators and Circulators, Multiplexers and Filters, Optical Amplifiers, Transmitters, Detectors, Switches, Wavelength Converters.

**UNIT II**

9

Transmission System Engineering: System Model, Power Penalty, Transmitter, Receiver, Optical Amplifiers, Crosstalk, Dispersion, Wavelength Stabilization, Overall Design Considerations. Optical Internets: Migration to IP optical networking, IP and Optical backbone, IP Routing table, MPLS and optical cross connect table, Protocol stack Alternatives, Internetworking SS7 and Legacy Transport, Internet transport network protocol stack.

**UNIT III**

9

SONET, SDH and Optical Transport Networks (OTNs): SONET and SDH: SONET multiplexing hierarchy, Frame structure, Functional Component, problem detection, concatenation. **Architecture of Optical Transport Networks** (OTNs): Digital wrapper, in-band and out-of band control signalling, Importance of Multiplexing and multiplexing hierarchies, SONET multiplexing hierarchies, SDH multiplexing hierarchies, New Optical Transport, OTN layered Model, Generic Framing Procedure (GFP)

**UNIT IV**

9

WDM, Network topologies, MPLS and Optical Networks: WDM: WDM operation, Dense Wavelength Division Multiplexing (DWDM), Erbium-doped Fiber (EDF), WDM amplifiers, Add-Drop Multiplexers, Wavelength Continuity Property, Higher dispersion for DWDM, Tunable DWDM Lasers.

**UNIT V**

9

Network topologies and protection schemes: Robust networks, Line and path protection switching, Types of topology, Point to point topology, bi-directional line-switched ring (BLSR), meshed topology, Passive optical networks, Metro optical networks 28 MPLS and Optical Networks: IS label switching, Forwarding equivalence class (FEC), Types of MPLS nodes, Label distribution and binding, label swapping and traffic forwarding, MPLS support of Virtual Private Networks (VPN), MPLS traffic engineering, Multi protocol Lambda switching (MPIS).

**TOTAL : 45 PERIODS****OUTCOMES:**

At the end of the course, the student should be able to:

- Design and Analyze Network Components
- Assess and Evaluate optical networks

**REFERENCES:**

1. Rajiv Ramaswami and Kumar Sivarajan, "Optical Networks – Practical Perspective", 3<sup>rd</sup> Edition, Morgan - Kaufmann Publishers.
2. Optical Networks, Third Generation Transport Systems, Uyles Black, Pearson

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**A NOVEL WEIGHTED PARTICLE  
SWARM OPTIMIZATION TECHNIQUE  
AND ANN CLASSIFICATION FOR BREAST  
CANCER TUMOR DETECTION**

A THESIS

*Submitted by*

**P.CHITRA**


*in partial fulfillment for the award of the degree of*

**MASTER OF ENGINEERING IN  
COMMUNICATION SYSTEMS**



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## BONAFIDE CERTIFICATE

Certified that this project report titled "A NOVEL WEIGHTED PARTICLE SWARM OPTIMIZATION (WPSO) TECHNIQUE AND ANN CLASSIFICATION FOR BREAST CANCER TUMOR DETECTION" is the bonafide work of **P.CHITRA** (621117403002) who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported here in does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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## ABSTRACT

Image processing techniques are particularly used as enhancement techniques in medical applications and various domains. The present study was carried out to analyze and predict tumor detection in breast cancer using Cramer Rao mechanism and Artificial Neural Network classification (ANN). The preprocessing system were used for enhancing the noise removal, filtering and contrast enhancement methods respectively and also analyzing the performance of the image using IBCR-SBI (Intensity based Cramer Rao - Straighen Boundary Condition) mechanism .This mechanism is also used for improving processing time and accuracy of segmenting tumor mass from breast region. To improve the accurate, detection of tumor extraction adopted Cramer-Rao mechanism which was based on the intensity of the pixel. For the further efficiency, improvisation of straihten boundary (SBI) approach is adopted for cancer edge detection. Based on WPSO, the weighted function in optimization algorithm images are clustered and extracted. Early detection is an effective way to diagnose and manage breast cancer can give a better chance of full recovery. The ANN classification is used to find cancer affected area which is a crucial step in breast cancer detection. The output of the classifier differentiates the normal, benign and malignant cases from applied digital mammographic images.

  
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**HYBRID PRECODING DESIGN**

**FOR MILLIMETER-WAVE**



**MASSIVE MIMO SYSTEM VIA CUA**

A THESIS

*Submitted by*

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## ABSTRACT

This project ruminates an energy-efficient, hybrid digital and analog precoding design problem in millimeter-wave massive multiple-input multiple-output systems, in which the analog precoder is realized with a small number of energy-efficient switches and inverters rather than with a large number of high resolution phase shifters. However, finding the optimal weights of such energy-efficient hybrid precoding technique required to solve a challenging computational problem. A known solver, namely “adaptive cross-entropy (ACE)”, can provide a reasonable solution but its computational complexity is still high. Thus, a simple yet effective coordinate update algorithm (CUA) is proposed in this project to reduce the computational complexity while maintaining and even improving the achievable rate performance. In addition, a new hybrid precoding architecture is proposed that introduces the antenna selection mechanism which consumes less energy than the conventional hybrid precoding architecture. The simulation results demonstrate that the proposed CUA-based solver provides 73% an improved achievable rate performance than the ACE-based solver at a lower complexity.

  
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**AN EFFECTIVE DATA  
GATHERING BASED ON  
HIERARCHICAL CO-CLUSTERING FOR SENSOR  
NETWORKS**

A THESIS

*Submitted by*

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*in partial fulfillment for the award of the degree of*

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## ABSTRACT

Compressive data gathering (CDG) based on compressed sensing (CS) theory for wireless sensor networks (WSNs) greatly reduces the amount of data transmitted compared with the traditional acquisition method that each node forwards the collected data directly to the next node. CDG combined with sparse random projection can further reduce the amount of data and thus prolong the lifetime of the WSN. The method of randomly selecting projection nodes as cluster heads to collect the weighted sum of sensor nodes outperforms the non-CS (without using CS) and hybrid-CS (applying CS only to relay nodes that are overloaded) schemes in decreasing the communication cost and distributing the energy consumption loads. However, the random selection of projection nodes causes the overall energy consumption of the network to be unstable and unbalanced. In this paper, we propose two compressive data gathering methods of balanced projection nodes. For WSN with uniform distribution of nodes, an even clustering method based on spatial locations is proposed to distribute the projection nodes evenly and balance the network energy consumption. For WSN with unevenly distributed nodes, an even clustering method based on node density is proposed, taking into account the location and density of nodes together, balancing the network energy and prolonging the network lifetime. The simulation results show that compared with the random projection node method and the random walk method, our proposed methods have better network connectivity and more significantly increased overall network lifetime.

  
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**DETECTION OF BORDER LINE  
MENTAL DIS-ORDER ON  
IMAGING OF ELECTRO CARDIO  
SIGNALS USING EMD**



**A THESIS**

*Submitted by*

**MARIYA EADEL QUEEN A**

*in partial fulfillment for the award of the degree of*

**MASTER OF ENGINEERING IN  
COMMUNICATION SYSTEMS**



**IDHAYA ENGINEERING COLLEGE FOR WOMEN  
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## ABSTRACT

The paper has been stimulated by the necessitate to find an competent method for electrocardiogram (ECG) signal investigation which is trouble-free and has high-quality precision and less computation time for decisive the absolute number of intrinsic mode functions (IMF) in ECG signals in patients under borderline mental disorder (BMD) to augment the reliability of analysis of cardiovascular diseases. Instructive parameters of ECG, namely, IMFs, were considered as the basis resources. The preliminary assignment for well-organized investigation is the elimination of noise. It essentially involves the taking out of the requisite cardiac components by rejecting the environment noise. Enhancement of signal is accomplished by the use of Empirical Mode Decomposition (EMD) method. The exploit of EMD was stirred by its adaptive nature. The analysis of the ECG signal is done with respect to recorded heart beat which can diagnosis the group of arrhythmia with Support vector machine (SVM) classifier. The simulation is done in MATLAB and LIBSVM environment. The experiments are carried out on MIT-BIH database. The results obtained through implementation of EMD with SVM methods are thus compared as per their accuracy rate in percentages and the performance of the SVM classifier with the various types of arrhythmia datasets were found to be improved and better than other techniques.

  
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**DEVELOPMENT OF AN AUTONOMOUS BEACH  
CLEANING ROBOT**



A THESIS

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## ABSTRACT

The aim is to design and develop an autonomous beach cleaning bot called 'B-BOT'. The operation of this machine is based on three mechanisms. They are Bot motion mechanism, scrap collecting mechanism, Automation mechanism. Scrap collecting vehicle consists of Ultra sonic sensor, Control unit, Roller broom fan, D.C motor, dustpan and Frame. The bot starts to move forward and the broom fan starts to rotate. The bot keeps collecting the scrap by using the rotation of broom fan. The detection of scrap is done by two ultrasonic sensors. If there are any obstacles on the path, the bot changes its direction automatically. The intention of this project is to build an Automatic Scrap Collecting Vehicle. The existing scrap collecting machine is manual and it does not work with Ultrasonic sensor which is used to collect the scrap in sandy areas.

  
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**CODEBOOK DESIGN FOR  
MILLIMETER-WAVE MASSIVE  
MIMO SYSTEMS RELYING ON LAA**



A THESIS

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## ABSTRACT

The recently proposed millimeter-wave (mmWave) massive MIMO system relying on a lens antenna array (LAA) significantly reduces the number of radio frequency (RF) chains using beam selection. A high data rate can be achieved based on the reduced-dimensional equivalent channel after beam selection. In frequency division duplexing (FDD) systems, the equivalent channel has to be signaled back to the base station (BS) via a feedback channel based on a codebook. However, no dedicated codebook has been proposed for LAA-aided mm-Wave systems. To fill this gap, in this paper, we propose a reduced-dimensional subspace codebook (RDSC) for LAA-aided mm Wave massive MIMO systems. Specifically, under the recently proposed concept of angle coherence time, we first generate the large-dimensional vectors in the channel subspace, which is determined by the angles-of-departure (AoDs) of the dominant paths. Then, based on these vectors in the channel subspace, we create the RDSC by considering both the lens and the beam selector, the equivalent channel is quantized using the proposed RDSC and feedback to the BS. Finally, we carry out mathematical performance analysis of the proposed RDSC and show that its feedback overhead is rendered proportional to the relatively small number of dominant paths per user. The analytical results are verified by our simulations.

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**AN EFFICIENT TECHNIQUES FOR  
PAPR REDUCTION IN OFDM  
SYSTEMS**



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## ABSTRACT

Communication is one of the important aspects of life. Multicarrier modulation schemes are widely used in wireless communications. Orthogonal Frequency Division Multiplexing (OFDM) is spectrally efficient multi-carrier modulation technique for high speed data channel signal transmission due to its robustness, over multipath fading channels. High peak-to-average power ratio (PAPR) has been one of the major drawbacks of orthogonal frequency division multiplexing (OFDM) systems. The aim of the project is to present the analysis to reduce the PAPR using the clipping and filtering, precoding, companding, Selected Mapping and Partial Transmit Sequence techniques are implemented for OFDM signal at transmitter. This results simulation using MATLAB shows a PAPR reduction and improvement of BER performance of the system. Also will concentrate the PAPR reduction-comparisons with different coding techniques.

  
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**SELF-ADAPTING QUORUM-  
BASED NEIGHBOR DISCOVERY  
IN WIRELESS SENSOR NETWORKS**



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## ABSTRACT

Neighbor discovery is a critical first step in establishing communication in a wireless ad-hoc network. Existing quorum-based neighbor discovery algorithms only consider a pair of nodes and ensure that this pair can communicate at least once in a bounded interval. However, when the node density of a wireless network increases, collisions are more likely to happen, which makes these quorum-based algorithms inefficient in practice. We propose a novel self-adapting quorum-based neighbor discovery algorithm that can dynamically adjust its cycle pattern to decrease the impact of such collisions. We first assess the collision problem in wireless networks when using quorum-based neighbor discovery algorithms and then establish a theoretical framework to analyze the discovery delay when considering collision effects. Guided by these theoretical results, we design a self-adapting mechanism for cycle patterns in quorum-based algorithms. Simulation results show that our algorithm can achieve complete neighbor discovery in less time than existing quorum-based neighbor discovery algorithms.

  
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**DETECTION OF CERVICAL CANCER  
IN COLPOSCOPY IMAGES USING  
WATERSHED SEGMENTATION**



**PHASE II REPORT**

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## ABSTRACT

Cervical cancer is the second most frequent cancer in women with an estimated 570,000 new cases in 2018. It is an abnormal growth of cervix tissue. The cervical cancer is caused by the human Papilloma virus (HPV). The high mortality rate from cervical cancer globally could be reduced through a comprehensive approach that includes prevention, early diagnosis, effective screening and treatment programmes. A methodology is presented to segment colposcopic images based on these temporal changes produced by the acetowhite reaction in order to support to the colposcopist in the early detection of cervical cancer. Various algorithms are used for the detection of cervical cancer. Here the watershed algorithm is used for the detection of cervical cancer. The watershed transformation was widely and successfully applied in different domains such as biomedicine, industry and generally in computer vision applications as a powerful segmentation tool. It is an image segmentation method based on mathematical morphology and it can realize parallel regional partition and get complete segmentation regions. The clustering algorithm essentially performs the same function as classifier methods without the use of training data. Classification of images can be performed by using SVM classifier. Experimental results show that SVMs achieve significantly higher search accuracy than traditional query refinement schemes. They have their roots in Statistical Learning Theory and have gained prominence because they are robust, accurate and are effective even when using a small training sample. The fine detection of affected area is a challenging task in medical image science. The percentage of infected area can be detected by using thresholding and watershed algorithm.

  
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**VEHICLE TO VEHICLE AND  
VEHICLE TO INFRASTRUCTURE  
COMMUNICATION BASED ON IOT**



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## ABSTRACT

This project develops a system for vehicle communication that addresses this problem. Vehicular Ad-Hoc Network (VANET) technology is utilized to create a distributed network allowing the exchange between automobiles on a large scale for the implementation of Vehicle-to-Vehicle (V2V), or Vehicle-to-Infrastructure (V2I) communication protocols. The goal of the research is to create a VANET environment and algorithm for collision detection. Collision avoidance emanates from the detection algorithm. To better understand the behavior of communicating vehicles and infrastructures, nodal representation of the road system will be generated to mimic real road topography. The physical experiment involves constructing a VANET implemented with microcontrollers, sensor systems and radio controlled cars. Integrating all these will generate a collision detecting system which helps improve traffic efficiency on a minute scale. This physical model was executed using an Arduino UNO, RGB LCD Shield, GPS Logger Shield, SR04 Ping Distance Sensor, RF 433 MHz Transmitter Module, RF 433 MHz Receiver Module and a DC motor (from the Car).

  
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**OBJECTIVES:**

- The student comprehends mathematical description and modelling of discrete time random signals.
- The student is conversant with important theorems and random signal processing algorithms.
- The student learns relevant figures of merit such as power, energy, bias and consistency.
- The student is familiar with estimation, prediction, filtering, multirate concepts and techniques.

**UNIT I DISCRETE RANDOM SIGNAL PROCESSING 9+6**

Discrete random processes – Ensemble averages – Wide sense stationary process – Properties - Ergodic process – Sample mean & variance - Auto-correlation and Auto-correlation matrices- Properties – White noise process – Weiner Khitchine relation - Power spectral density – Filtering random process – Spectral Factorization Theorem – Special types of Random Processes – AR, MA, ARMA Processes – Yule-Walker equations.

**UNIT II SPECTRUM ESTIMATION 9+6**

Bias and Consistency of estimators - Non-Parametric methods – Periodogram – Modified Periodogram – Barlett's method – Welch's method – Blackman-Tukey method – Parametric methods – AR, MA and ARMA spectrum estimation - Performance analysis of estimators.

**UNIT III SIGNAL MODELING AND OPTIMUM FILTERS 9+6**

Introduction- Least square method – Pade approximation – Prony's method – Levinson Recursion – Lattice filter - FIR Wiener filter – Filtering – Linear Prediction – Non Causal and Causal IIR Wiener Filter – Mean square error – Discrete Kalman filter.

**UNIT IV ADAPTIVE FILTERS 9+6**

FIR Adaptive filters - Newton's steepest descent method – Widrow Hoff LMS Adaptive algorithm – Convergence – Normalized LMS – Applications – Noise cancellation - channel equalization – echo canceller – Adaptive Recursive Filters - RLS adaptive algorithm – Exponentially weighted RLS- sliding window RLS.

**UNIT V MULTIRATE SIGNAL PROCESSING 9+6**

Decimation - Interpolation – Sampling Rate conversion by a rational factor I/D – Multistage implementation of sampling rate conversion – Polyphase filter structures – Applications of multirate signal processing.

**TOTAL 45+30: 75 PERIODS****OUTCOMES:**

- Formulate time domain and frequency domain description of Wide Sense Stationary process in terms of matrix algebra and relate to linear algebra concepts.
- State W-K theorem, spectral factorization theorem, spectrum estimation, bias and consistency of estimators.
- Wiener filtering, LMS algorithms, Levinson recursion algorithm, applications of adaptive filters
- Decimation, interpolation, Sampling rate conversion, Applications of multirate signal processing

**REFERENCES:**

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4. S. Kay, "Modern spectrum Estimation theory and application", Prentice Hall, Englewood Cliffs, NJ 1988.
5. Simon Haykin, "Adaptive Filter Theory", Prentice Hall, Englewood Cliffs, NJ 1986.
6. Sophoncles J. Orfanidis, "Optimum Signal Processing", McGraw-Hill, 2000.

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**OBJECTIVES:**

- To understand the usage of algorithms in computing.
- To learn and use hierarchical data structures and its operations
- To learn the usage of graphs and its applications.
- To select and design data structures and algorithms that is appropriate for problems.
- To study about NP Completeness of problems.

<b>UNIT I</b>	<b>ROLE OF ALGORITHMS IN COMPUTING</b>	<b>12</b>
Algorithms – Algorithms as a Technology- Insertion Sort – Analyzing Algorithms – Designing Algorithms- Growth of Functions: Asymptotic Notation – Standard Notations and Common Functions- Recurrences: The Substitution Method – The Recursion-Tree Method		
<b>UNIT II</b>	<b>HIERARCHICAL DATA STRUCTURES</b>	<b>12</b>
Binary Search Trees: Basics – Querying a Binary search tree – Insertion and Deletion- Red-Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion -B-Trees: Definition of B-trees – Basic operations on B-Trees – Deleting a key from a B-Tree- Fibonacci Heaps: structure – Mergeable-heap operations- Decreasing a key and deleting a node-Bounding the maximum degree.		
<b>UNIT III</b>	<b>GRAPHS</b>	<b>12</b>
Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First Search – Topological Sort – Strongly Connected Components- <b>Minimum Spanning Trees: Growing a Minimum Spanning Tree</b> – Kruskal and Prim- Single-Source Shortest Paths: The Bellman-Ford algorithm – Single-Source Shortest paths in Directed Acyclic Graphs – Dijkstra's Algorithm; All-Pairs Shortest Paths: Shortest Paths and Matrix Multiplication – The Floyd- Warshall Algorithm;		
<b>UNIT IV</b>	<b>ALGORITHM DESIGN TECHNIQUES</b>	<b>12</b>
Dynamic Programming: Matrix-Chain Multiplication – Elements of Dynamic Programming – Longest Common Subsequence- Greedy Algorithms: An Activity-Selection Problem – Elements of the Greedy Strategy- Huffman Codes.		
<b>UNIT V</b>	<b>NP COMPLETE AND NP HARD</b>	<b>12</b>
NP-Completeness: Polynomial Time – Polynomial-Time Verification – NP- Completeness and Reducibility – NP-Completeness Proofs – NP-Complete Problems		
		<b>TOTAL: 60 PERIODS</b>

**OUTCOMES:**

**Upon the completion of the course the students should be able to:**

- Design data structures and algorithms to solve computing problems
- Design algorithms using graph structure and various string matching algorithms to solve real-life problems
- Apply suitable design strategy for problem solving

**REFERENCES:**

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, —Data Structures and AlgorithmsI, Pearson Education, Reprint 2006.
2. Robert Sedgewick and Kevin Wayne, —ALGORITHMSI, Fourth Edition, Pearson Education.
3. S.Sridhar, IDesign and Analysis of AlgorithmsI, First Edition, Oxford University Press. 2014
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms, Third Edition, Prentice-Hall, 2011.

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**OBJECTIVES:**

- To understand the competitive advantages of big data analytics
- To understand the big data frameworks
- To learn data analysis methods
- To learn stream computing
- To gain knowledge on Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

**UNIT I****INTRODUCTION TO BIG DATA**

7

Big Data – Definition, Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools

**UNIT II****HADOOP FRAMEWORK**

9

Distributed File Systems - Large-Scale File System Organization – HDFS concepts - MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication – Hadoop YARN

**UNIT III****DATA ANALYSIS**

13

Statistical Methods: Regression modelling, Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, **Types of Data in Cluster Analysis**, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data - Predictive Analytics – Data analysis using R.

**UNIT IV****MINING DATA STREAMS**

7

Streams: Concepts – Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-series data - Real Time Analytics Platform (RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

**UNIT V****BIG DATA FRAMEWORKS**

9

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – Hbase Clients – Examples – .Cassandra: Data Model – Examples – Cassandra Clients – Hadoop Integration. Pig – Grunt – Pig Data Model – Pig Latin – developing and testing Pig Latin scripts. Hive – Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQL Queries

**TOTAL: 45 PERIODS****OUTCOMES:**

**At the end of this course, the students will be able to:**

- Understand how to leverage the insights from big data analytics
- Analyze data by utilizing various statistical and data mining approaches
- Perform analytics on real-time streaming data
- Understand the various NoSQL alternative database models

**REFERENCES:**

1. Bill Franks, —Taming the Big Data Tidal Wave: Finding Opportunities in Huge DataStreams with Advanced Analytics, Wiley and SAS Business Series, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
3. Michael Berthold, David J. Hand, —Intelligent Data Analysis, Springer, Second Edition, 2007.
4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
5. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
6. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, , O'Reilly Media, 2013.

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**OBJECTIVES:**

- To understand the concepts of virtualization and virtual machines
- To gain expertise in server, network and storage virtualization.
- To understand and deploy practical virtualization solutions and enterprise solutions
- To gain knowledge on the concept of virtualization that is fundamental to cloud computing
- To understand the various issues in cloud computing
- To be able to set up a private cloud
- To understand the security issues in the grid and the cloud environment

**UNIT I VIRTUALIZATION 9**

Basics of Virtual Machines - Process Virtual Machines – System Virtual Machines –Emulation – Interpretation – Binary Translation - Taxonomy of Virtual Machines. Virtualization –Management Virtualization — Hardware Maximization – Architectures – Virtualization Management – StorageVirtualization – Network Virtualization

**UNIT II VIRTUALIZATION INFRASTRUCTURE 9**

Comprehensive Analysis – Resource Pool – Testing Environment –Server Virtualization – VirtualWorkloads –Provision Virtual Machines – Desktop Virtualization – Application Virtualization -Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data centerautomation.

**UNIT III CLOUD PLATFORM ARCHITECTURE 9**

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software- **A Generic Cloud Architecture Design** – Layered cloud Architectural Development – Virtualization Support and Disaster Recovery –Architectural Design Challenges - Public Cloud Platforms : GAE,AWS – Inter-cloud ResourceManagement

**UNIT IV PROGRAMMING MODEL 9**

Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job –Developing Map Reduce Applications - Design of Hadoop file system –Setting up Hadoop Cluster - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus

**UNIT V CLOUD SECURITY 9**

Cloud Infrastructure security: network, host and application level — aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud - Key privacy issues in the cloud –Cloud Security and Trust Management

**TOTAL : 45 PERIODS****OUTCOMES:****Upon completion of this course, the students should be able to:**

- Employ the concepts of storage virtualization, network virtualization and its management
- Apply the concept of virtualization in the cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Develop services using Cloud computing
- Apply the security models in the cloud environment

**REFERENCES:**

1. Danielle Ruest, Nelson Ruest, —Virtualization: A Beginner’s Guidel, McGraw-Hill OsborneMedia, 2009.
2. Jim Smith, Ravi Nair , "Virtual Machines: Versatile Platforms for Systems and Processes",Elsevier/Morgan Kaufmann, 2005
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation,Management, and Security", CRC Press, 2010.
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, FromParallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
5. Tim Mather, Subra Kumaraswamy, and Shahed Latif ,"Cloud Security and Privacy", O’ReillyMedia, Inc.,2009.
6. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009.

**OBJECTIVES:**

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

**UNIT I INTRODUCTION TO IoT**

9

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

**UNIT II IoT ARCHITECTURE**

9

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

**UNIT III IoT PROTOCOLS**

9

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 IV BUILDING IoT WITH RASPBERRY PI & ARDUINO**

9

Building IOT with RASPBERRY 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 - Other IoT Platforms - Arduino.

**UNIT V CASE STUDIES AND REAL-WORLD APPLICATIONS**

9

Real world design constraints - Applications - Asset management, Industrial automation, smartgrid, 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.

**TOTAL : 45 PERIODS****OUTCOMES:****Upon completion of this course, the students should be able to:**

- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Raspberry Pi
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

**REFERENCES:**

1. Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.
3. Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspective, CRC Press, 2012.
4. Jan Ho" ller, Vlasios Tsiatsis , 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.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols, Wiley, 2012

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CP519

**MACHINE LEARNING TECHNIQUES**

L T P C  
3 0 0 3

**OBJECTIVES:**

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms

**UNIT I INTRODUCTION 9**

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

**UNIT II LINEAR MODELS 9**

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back- Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

**UNIT III TREE AND PROBABILISTIC MODELS 9**

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

**UNIT IV DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS 9**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

**UNIT V GRAPHICAL MODELS 9**

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon completion of this course, the students will be able to:**

- Distinguish between, supervised, unsupervised and semi-supervised learning
- Apply the appropriate machine learning strategy for any given problem
- Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
- Design systems that uses the appropriate graph models of machine learning
- Modify existing machine learning algorithms to improve classification efficiency

**REFERENCES:**

- 1 Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)I, Third Edition, MIT Press, 2014
- 2 Jason Bell, —Machine learning – Hands on for Developers and Technical ProfessionalsI, First Edition, Wiley, 2014
- 3 Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of DataI, First Edition, Cambridge University Press, 2012.
- 4 Stephen Marsland, —Machine Learning – An Algorithmic PerspectiveI, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

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**OBJECTIVES:**

- Understand system requirements for mobile applications.
- Generate suitable design using specific mobile development frameworks.
- Generate mobile application design.
- Implement the design using specific mobile development frameworks.
- Deploy the mobile applications in marketplace for distribution.

**UNIT I INTRODUCTION 5**

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications.

**UNIT II BASIC DESIGN 8**

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

**UNIT III ADVANCED DESIGN 8**

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – **Accessing applications hosted in a cloud computing environment** – Design patterns for mobile applications.

**UNIT IV ANDROID 12**

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

**UNIT V IOS 12**

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

**TOTAL :45 PERIODS****OUTCOMES:****Upon completion of the course, the students should be able to:**

- Describe the requirements for mobile applications.
- Explain the challenges in mobile application design and development.
- Develop design for mobile applications for specific requirements.
- Implement the design using Android SDK.
- Implement the design using Objective C and iOS.
- Deploy mobile applications in Android and iPhone marketplace for distribution.

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**OBJECTIVES:**

- To understand the principles required for network design
- To explore various technologies in the wireless domain
- To study about 3G and 4G cellular networks
- To understand the paradigm of Software defined networks

**UNIT I NETWORK DESIGN**

10

Advanced multiplexing – Code Division Multiplexing, DWDM and OFDM – Shared media networks – Switched networks – End to end semantics – Connectionless, Connection oriented, Wireless Scenarios – Applications, Quality of Service – End to end level and network level solutions. LAN cabling topologies – Ethernet Switches, Routers, Firewalls and L3 switches – Remote Access Technologies and Devices – Modems and DSLs – SLIP and PPP – Core networks, and distribution networks.

**UNIT II WIRELESS NETWORKS**

9

IEEE802.16 and WiMAX – Security – Advanced 802.16 Functionalities – Mobile WiMAX -802.16e – Network Infrastructure – WLAN – Configuration – Management Operation – Security – IEEE 802.11e and WMM – QoS – Comparison of WLAN and UMTS – Bluetooth – Protocol Stack – Security – Profiles

**UNIT III CELLULAR NETWORKS**

9

GSM – Mobility Management and call control – GPRS – Network Elements – Radio Resource Management – Mobility Management and Session Management – Small Screen Web Browsing over GPRS and EDGE – MMS over GPRS – UMTS – Channel Structure on the Air Interface – UTRAN – Core and Radio Network Mobility Management – UMTS Security

**UNIT IV 4G NETWORKS**

9

LTE – Network Architecture and Interfaces – FDD Air Interface and Radio Networks – Scheduling – Mobility Management and Power Optimization – LTE Security Architecture – Interconnection with UMTS and GSM – LTE Advanced (3GPP Release 10) - 4G Networks and Composite Radio Environment – Protocol Boosters – Hybrid 4G Wireless Networks Protocols – Green Wireless Networks – Physical Layer and Multiple Access – Channel Modelling for 4G

**UNIT V SOFTWARE DEFINED NETWORKS**

9

Introduction – Centralized and Distributed Control and Data Planes – Open Flow – SDN Controllers – General Concepts – VLANs – NVGRE – Open Flow – Network Overlays – Types – Virtualization – Data Plane – I/O – Design of SDN Framework

**TOTAL : 45 PERIODS****OUTCOMES:**

Upon completion of this course, the students should be able to

- Identify the components required for designing a network
- Design a network at a high-level using different networking technologies
- Analyze the various protocols of wireless and cellular networks
- Discuss the features of 4G and 5G networks
- Experiment with software defined networks

**REFERENCES:**

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**OBJECTIVES:**

- To understand the architecture of embedded processor, microcontroller and peripheral devices.
- To interface memory and peripherals with embedded systems.
- To study the embedded network environment.
- To understand challenges in Real time operating systems.
- To study, analyze and design applications on embedded systems.

**UNIT I EMBEDDED PROCESSORS**

9

**Embedded Computers - Characteristics of Embedded Computing Applications** - Challenges in Embedded Computing System Design - Embedded System Design Process- Formalism for System Design - Structural Description - Behavioural Description - ARM Processor - Intel ATOM Processor.

**UNIT II EMBEDDED COMPUTING PLATFORM**

9

CPU Bus Configuration - Memory Devices and Interfacing - Input/Output Devices and Interfacing - System Design - Development and Debugging - Emulator - Simulator - JTAG Design Example - Alarm Clock - Analysis and Optimization of Performance - Power and Program Size.

**UNIT III EMBEDDED NETWORK ENVIRONMENT**

9

**Distributed Embedded Architecture - Hardware And Software Architectures** - Networks for Embedded Systems - I2C - CAN Bus - SHARC Link Supports - Ethernet - Myrinet - Internet - Network-based Design - Communication Analysis - System Performance Analysis - Hardware Platform Design - Allocation and Scheduling - Design Example - Elevator Controller.

**UNIT IV REAL-TIME CHARACTERISTICS**

9

Clock Driven Approach - Weighted Round Robin Approach - Priority Driven Approach - Dynamic versus Static Systems - Effective Release Times and Deadlines - Optimality of the Earliest Deadline First (EDF) Algorithm - Challenges in Validating Timing Constraints in Priority Driven Systems - Off-Line versus On-Line Scheduling.

**UNIT V SYSTEM DESIGN TECHNIQUES**

9

Design Methodologies - Requirement Analysis - Specification - System Analysis and Architecture Design - Quality Assurance - Design Examples - Telephone PBX - Ink jet printer - Personal Digital Assistants - Set-Top Boxes.

**TOTAL: 45 PERIODS****OUTCOME:**

**Upon completion of the course, the students should be able to**

- Understand different architectures of embedded processor, microcontroller and peripheral devices. Interface memory and peripherals with embedded systems.
- Work with embedded network environment.
- Understand challenges in Real time operating systems.
- Design and analyze applications on embedded systems.

**REFERENCES:**

1. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things" Wiley Publication, First edition, 2013
2. Andrew N Sloss, D. Symes, C. Wright, "ARM system developers guide", MorganKauffman/Elsevier, 2006.
3. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach" VPT First Edition, 2014
4. C. M. Krishna and K. G. Shin, "Real-Time Systems", McGraw-Hill, 1997
5. Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Introduction", John Wiley & Sons.
6. Jane W.S. Liu, "Real-Time systems", Pearson Education Asia.
7. Michael J. Pont, "Embedded C", Pearson Education, 2007.
8. Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi, "The AVR Microcontroller and Embedded Systems: Using Assembly and C" Pearson Education, First edition, 2014
9. Steve Heath, "Embedded System Design", Elsevier, 2005
10. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.

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**CLOUD SECURITY WITH OPTIMIZE MULTICAST  
COMPUTING COLLABORATIVE FOR DATA  
PROVISIONING**

**PHASE II REPORT**

*Submitted by*

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*In partial fulfillment for the award of the degree of*

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**IN**

**COMPUTER SCIENCE AND ENGINEERING**



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## BONAFIDE CERTIFICATE

Certified that this report titled "CLOUD SECURITY WITH OPTIMIZE MULTICAST COMPUTING COLLABORATIVE FOR DATA PROVISIONING" is the bonafide work of "BRINDHA.P" who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported here in does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.



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Submitted for the Project Phase II viva voce held on 21.05.19

*S. Jay. Pr*  
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## ABSTRACT

In cloud computing, the modern cloud data centers are hosting a variety of advanced applications and the IT infrastructure over the recent years because of the demand for computational power infrastructure which are widely used by some of the applications increasing rapidly. Due to the enormous amount of electrical energy consumed by the huge cloud data centers, the operating cost and the emission of carbon dioxide (Co<sub>2</sub>) produces the high value as a result. In order to reduce the energy consumption and to increase the physical resource utilization in data centers, the most effective way used is a dynamic consolidation of virtual machines (VMs). The main purpose of this paper is to provide a novel method which is used in dynamic virtual machine consolidation. This proposed novel method has outperformed the existing policies in terms of energy consumption, SLA violation and VM migration time by surveying the determination of under loaded hosts, determination of overloaded hosts, selection of VM and placement of the migrating VMs.

  
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**A FLIMSY FIRM DATA SHARING SCHEME FOR MOBILE  
CLOUD COMPUTING**

**PHASE II REPORT**

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Certified that this report titled. "A FLIMSY FIRM DATA SHARING SCHEME FOR MOBILE CLOUD COMPUTING" is the bonafide work of "AJAY KANCHANA.A" who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported here in does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

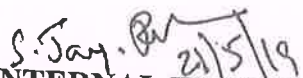
  
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## ABSTRACT

A new three tier access control scheme for secure data storage in servers that supports anonymous authentication. In the proposed scheme, the cloud verifies the authenticity of the server without knowing the user's identity before storing data. Our scheme also has the added feature of access control in which only valid users are able to decrypt the stored information. The scheme prevents replay attacks and supports file Upload, Download, Comment, Delete and reading data stored in the cloud. We also address user revocation & Data Backup. Moreover, our authentication and access control scheme is decentralized and robust, unlike other access control schemes designed for clouds which are centralized. The communication, computation, and storage overheads are comparable to centralized approaches.

  
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**THE QUALITY ATTRIBUTE BASED ARCHITECTURAL  
TACTIC DESIGN STRATEGY ON BIG DATA  
CYBERSECURITY**

**PHASE II REPORT**

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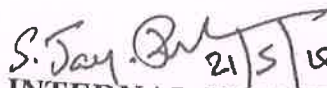
  
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## ABSTRACT

Initially linear dataset is formed for efficient retrieval of data from a huge database. Before undergoing the process of knowledge discovery feature reduction process is implemented. This reduces the dimensionality and increases the space of data storage. Hence the map reduce is processed for the next step in knowledge discovering process to remove unwanted and irrelevant data from the database. The Support Vector Machine is one of the classification techniques used. This overcome the problem of k Means disadvantage, it does not support effectively for both linear and nonlinear format of data. Map Reduce method to add privacy to a huge database can be obtained by adding dual authentication technique which ensures the privacy of the user without over heading the process. This overcomes the overlapping issue caused by the k means algorithm and it also reduces the issue of finding the distance between the record and cluster.

  
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**EDGE COMPUTING NETWORKS BASED COMPUTATION  
REDUCED IN CENTRALIZED DATA CENTER**

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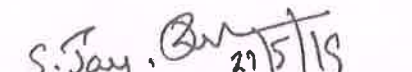
  
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**ABSTRACT**

Advances made in the wearable and biosensor has attracted the applicability and usability of the healthcare applications. The biosensors collect the human physiological data from a remote area using wireless communication medium. Different form of security implications have to be exhibited in Edge Computing Networks. This paper researches on enhancing the network layer and application layer of the Edge Computing Networks in healthcare environment. The objective of the each phase is to enhance the data accuracy of the collected data with minimized delay. In the first phase, I constructed attack model for Sybil, Sinkhole and Wormhole attacks and detected those attacks under different constraints. Secondly, an efficient packet transmission model which helps to transmit the sensed data based on their emergency using Weighted Product Model (WPM). After devising network layer, a lightweight security scheme, an improved Elliptic Curve Cryptography (ECC) that permits the data access for the authorized users. Experimental analysis is carried out for each phase under pre-defined simulation parameters which explores better results. The framed attack model detects the three eminent attacks in terms of False Positive Rate (FPR) and False Negative Rate (FNR) which helps the Data Controller for message transmission process. Likewise, we have also achieved 97% Packet Delivery Ratio with 0.8ms Packet Dropping Ratio for better packet transmission model than the existing TOPSIS model.

  
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**ROBOTIC CLOUD BASED SERVICE ORIENTED  
FOR DRONE TRACKING SYSTEM**

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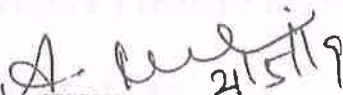
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## ABSTRACT

With the rapid growth of social media, has become one of the most widely adopted platforms for people to post short and instant message. On the one hand, people tweets about their daily lives, and on the other hand, when major events happen, people also follow and tweet about them. Moreover, people's posting behaviors on events are often closely tied to their personal interests. Try to model topics, events and users on social network in a unified way. Propose a model which combines a like topic model and the Recurrent Chinese Restaurant Process to capture topics and events. Further propose a duration-based regularization component to find busy events. Propose to use event-topic affinity vectors to model the association between events and topics. Experiments shows that model can accurately identify meaningful events and the event-topic affinity vectors are effective for event recommendation and grouping events by topics.

  
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**INFRASTRUCTURE AND OPERATIONS BASED**

**RESOURCE SHARING IN DATA CENTER**

**NETWORKS**

**PHASE II REPORT**

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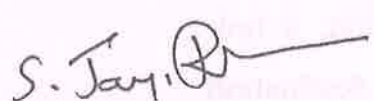
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## ABSTRACT

Mobility management in Mobile Wireless Sensor Networks (MWSNs) is a complex problem that must be taken into account. In MWSN, nodes move in and out of the network randomly. Hence, a path formed between two distant nodes is highly susceptible to changes due to unpredictable node movement. Also, due to the limited resources in WSN, the paths used for data transmission must be tested for the link quality and time consumed for data forwarding. In order to solve these issues, an Ant based routing protocol with QoS effective data collection mechanism is proposed. In this protocol, the link quality and link delay are estimated for each pair of nodes. Link quality is estimated in terms of Packet Reception Rate (PRR), Received Signal Strength Indicator (RSSI) and Link Quality Index (LQI). A reliable path is chosen from the source to the destination based on the paths traversed by forward ants and backward ants. Then, if the link is found to be defective during data transmission, a link reinforcement technique is used to deliver the data packet at the destination successfully. The mobile robots collect the information with high data utility. In addition each mobile robot is equipped with multiple antennas and Space Division Multiple Access (SDMA) technique is then applied for effective data collection from multiple mobile robots. Simulation results show that the proposed routing protocol provides reliability by reducing the packet drop and end-to-end delay when compared to existing protocols.

  
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**APROCEDURE FOR SECURE SHARING OF INDIVIDUAL  
WELLBEING RECORDS IN THE CLOUD**

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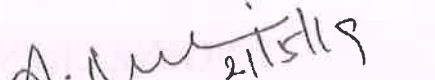
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## ABSTRACT

The broad acknowledgment of cloud based administrations in the medicinal services area has brought about financially savvy and helpful trade .of Personal Health Records (PHRs) among a few taking an interest elements of the e-Health frameworks. By the by, putting away the secret wellbeing data to cloud servers is helpless to disclosure or robbery and requires the improvement of philosophies that guarantee the protection of the PHRs. Along these lines, we propose a system called SeSPHR for secure sharing of the PHRs in the cloud. The SeSPHR plot guarantees understanding driven control on the PHRs and jam the secrecy of the PHRs. The patients store the scrambled PHRs on the un-confided in cloud servers and specifically concede access to various sorts of clients on various bits of the PHRs. A semi-confided intermediary called Setup and Re-encryption Server (SRS) is acquainted with set up people in general/private key combines and to create the re-encryption keys. Besides, the technique is secure against insider dangers and furthermore implements a forward and in reverse access control. Besides, we formally dissect and confirm the working of SeSPHR philosophy through the High Level Petri Nets (HLPN). Execution assessment with respect to time utilization shows that the SeSPHR approach can possibly be utilized for safely sharing the PHRs in the cloud.

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**AN ACCESS CONTROL SYSTEM IN CLOUD STORAGE  
WITH SCALABLE USER REVOCATION FOR SHARING  
DATA**

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**IN**

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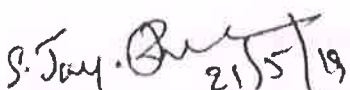
  
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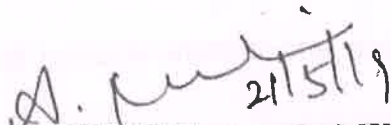
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## ABSTRACT

Cloud providers ensure that applications available as a service via the cloud are secure by implementing testing and acceptance procedures for outsourced or packaged application code. It also requires application security measures are in place in the production environment. Due to the data outsourcing, however, this new paradigm of data hosting service also introduces new security challenges, which requires an independent auditing service to check the data integrity in the cloud. Some existing remote integrity checking methods can only serve for static archive data and, thus, cannot be applied to the auditing service since the data in the cloud can be dynamically updated. In this paper, we propose the construction of a powerful Thrice key Auditing Algorithm for support efficient handling of multiple auditing tasks, where TPA can perform multiple auditing tasks by using this algorithm very fast and safe. The proposed system is going to find out the check fill attack vulnerabilities and it can be solved efficiently. Our further proposed system is going to reduce the cost, increase the time efficiency and security efficiency by using triple key technique. Our experiments show that our solution introduces lower computation and communication overheads in comparison with non-cooperative approaches.

  
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