DEPARTMENT OF ECE

1.3.2 courses that include experiential learning through project work/field work/internship during 2022-2023

S.No	Title of IV Year Project	Subject code & Subjects name related to the Projects
1	FETAL HEALTH CLASSIFICATION USING ML	GE8151 - Problem Solving and Python Programming EC8093 - Digital Image Processing
2	SEA-WAVE BORDER ALERT SYSTEM iMPLEMENTATION OF MACHINE LEARNING ALGORITHM & RSS	EC8791 - Embedded and Real Time Systems, IVA067 - IoT using Arduino.
3	IOT BASED SMART AGRICULTURE SYSTEM AND WHETHER FORECASTING	EC8791 - Embedded and Real Time Systems, IVA067 - IoT using Arduino.
4	MACHINE LEARNING APPROACH FOR ECG CLASSIFICATION USING ENERGY EFFICIENT FPGA PROCESSOR	EC8095 VLSI Design EC8073 – Medical Electronics EC8093 - Digital Image Processing
5	SMART ROBOT	BE8254 – Basic Electrical and Instrumentation Engineering IVA067 - IoT using Arduino.
6	GLAUCOMA DETECTION IN FUNDUS IMAGES USING CONVOLUTION NEURAL NETWORK BASED SEGMENTATION METHOD	EC8093 - Digital Image Processing
7	IOT BASED INSECTS FREE AND LIVE PARAMETER BIRD EGG INCUBATOR	EC8351 – Electronics Circuits - I IVA067 - IoT using Arduino.
8	VEHICLE INFORMATION STORAGE CONTAINER WITH RECOVERY USING ESP32 CAM	EC8791 - Embedded and Real Time Systems, IVA067 - IoT using Arduino.

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HOD / ECE

FETAL HEALTH CLASSIFICATION USING ML

A PROJECT REPORT

Submitted by

ASSIFA. A(311819106004)
AKSHAYA .K(311819106002)
PATTAPU PRATHYUSHA(311819106015)

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING,
SIRUSERI, EGATTUR,CHENNAI-603103.

PROGRESS THROUGH KNOWLEDGE

ANNA UNIVERSITY : CHENNAI 600 025

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Chennai - 603103.

MAY 2023

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"FETAL HEALTH CLASSIFICATION USING ML"** is the bonafide work of **AKSHAYA.K(311819106002), ASSIFA.A(311819106004), PATTAPU PRATHYUSHA(311819106015)** who carried out the project work under my supervision.

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SIGNATURE 17/05/2023

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Project Viva-Voce held on ....18-05-2023..........

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

Health complications during the gestation period have evolved as a global issue. These complications sometimes result in the mortality of the fetus, which is more prevalent in developing and underdeveloped countries. The genesis of machine learning (ML) algorithms in the healthcare domain have brought remarkable progress in disease diagnosis, treatment, and prognosis. Around 800 women die every day due to pregnancy and childbirth-related issues. Maternal health and fetal health are closely associated with each other because every year approximately 3 million newborn babies die. So there is a need for proper care including the prediction of risk levels before, during and after the delivery for the safety of both mother and child. Data mining is a commonly used technique for processing enormous data. Researchers apply several data mining and machine learning techniques to analyse huge complex data, helping health care professionals to predict fetal health. Different algorithms are compared and the best model is used for predicting the fetal health.

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IV

9.2 CONCLUSION

The analytical process started from data cleaning and processing, missing value, exploratory analysis and finally model building and evaluation. The best accuracy on public test set of higher accuracy score algorithm will be find out. The found one is used in the application which can help to find the health of the fetal.

9.3 FUTURE WORK

❖ Deploying the project in the cloud.

❖ To optimise the work to implement in the IOT system.

9.4 REFERENCES

- A. K. Pradhan, J. K. Rout, A. B. Maharana, B. K. Balabantaray and N. K. Ray, "A Machine Learning Approach for the Prediction of Fetal Health using CTG," *2021 19th OITS International Conference on Information Technology (OCIT)*, Bhubaneswar, India, 2021, pp. 239-244, doi: 10.1109/OCIT53463.2021.00056.

- Chandana, C., Neha, P.N., Nisarga, S.M., Thanvi, P., Balarengadurai, C. (2023). Fetal Health Prediction Using Machine Learning Approach. In: Kumar, A., Mozar, S., Haase, J. (eds) Advances in Cognitive Science and Communications. ICCCE 2022.

- Naveen Reddy Navuluri, 2021, Fetal Health Prediction using Classification Techniques, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) Volume 10, Issue 11 (November 2021),

- Mehbodniya, Abolfazl & Lazar, Arokia & Webber, Julian & Sharma, Dilip & Jayagopalan, Santhosh & Kittusamy, Kousalya & Singh, Pallavi & Rajan, Regin & Pandya, Sharnil & Sengan, Sudhakar. (2022). Fetal

REFERENCES:
1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

GE8151	PROBLEM SOLVING AND PYTHON PROGRAMMING	L T P C
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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, mergesort, 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

EC8093	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

UNIT I   DIGITAL IMAGE FUNDAMENTALS   9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II   IMAGE ENHANCEMENT   9

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, Homomorphic filtering, Color image enhancement.

UNIT III   IMAGE RESTORATION   9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV   IMAGE SEGMENTATION   9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V   IMAGE COMPRESSION AND RECOGNITION   9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS

SEA-WAY BORDER ALERT SYSTEM IMPLEMENTATION OF MACHINE LEARNING ALGORITHM & RSSI

A PROJECT REPORT

Submitted by

ASHWINI. A (311819106003)

BHEULAH. G.L (311819106006)

RESMA. G (311819106017)

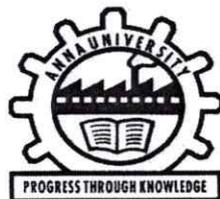*in partial fulfillment for the award of the degree*

of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

ANNA UNIVERSITY: CHENNAI 600025

MAY 2023

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BONAFIED CERTIFICATE

Certified that this project report **"SEA-WAY BORDER ALERT SYSTEM IMPLEMENTATION OF MACHINE LEARNING ALGORITHM & RSSI "** is the bonafide work of **"ASHWINI.A (311819106003), BHEULAH .G.L (311819106006) & RESMA.G (311819106017) "** who carried out this project work under my supervision.

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Project Viva – Voce held on _____18/5/23_____

INTERNAL EXAMINER

EXTERNAL EXAMINER

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ABSTRACT

The technology proliferation of Received Signal Strength Indication (RSSI) is used to provide location based positioning and time details in all climatic conditions and even anywhere any time. This method focuses on implementing border identification system for all boats. However, the existing system is not powerful enough to prevent the crime against fishermen as it gives only the information about the border identification but not about the exact distance that the boat has travelled from the border the proposed system's transmitter section includes microcontroller RSSI module, voice playback circuit and DC motor and the receiver section includes RSSI. The machine learning algorithm is used to predict the future rain fall for assistive system for fishermen.

KEYWORDS: MACHINE LEARNING, RAIN PREDICTION, BORDER ALERT, RSSI.

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iv

6.4 CONCLUSION

The android application which we have developed will provide an effective solution and prevent fishermen's from crossing other country border. The application can save the lives of many fishermen. In future this idea can be enhanced by using smart watches and satellite phones. Area based alarm administrations are fundamental segments for fisherman's, because of awful atmosphere conditions and slacking of innovation in salvage bolster our angler's confronting an actual existence time issue with neighbour nations. On considering the issue we proposed an ease and simple climate alert framework for angler's which is utilized to follow their family members, companions and other fisherman's. In the event that some fisher man confronting any issues like unexpected climatic changes or crisis mean this framework will help to the angler. Right now are going to screen climate state of the angling territory by utilizing sensors like stickiness and temperature, wind speed sensor and Rain sensor this sensor ceaselessly sense the angler angling zone consistently and send information to the server utilizing zigbee module constantly at whatever point they need any assistance implies there is crisis button is there on the off chance that they press mean alarm was sent to the specific primary server where they get salvage and GPS Location is additionally sent. On the off chance that the climate condition isn't acceptable additionally ready will sent naturally and bell will begin to ring to caution the other individual in the vessel. In typical climatic condition the information from sensor's and GPS area of the pontoon is constantly refreshed in the principle server and furthermore showed in LCD show.

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		L	T	P	C
Semester -6   **Value Added Course on**   L   T   P   C

Semester -6

Value Added Course on
IOT USING ARDUINO

L   T   P   C

1   0   2   2

Objectives:

- To expose student and gain knowledge about Arduino technology with IOT
- To Program and construct applications using Arduino using a number of different sensors and IOT

Unit – I Introduction to Arduino
Embedded processing portfolio, Architecture and hardware organization of Arduino, Configuring GPIO and Clock systems, Real time applications using GPIO configuration, LCD interfacing, Technical explanation ADC, Configuring ADC, Real time applications using Sensors

Unit – II Interfacing with Zigbee
Bluetooth Interfacing, Android mobile based device control ,GSM interfacing and send SMS, Real time Application Development with GSM ,Zigbee Interfacing, Data transmission using zigbee, Real time applications interfacing with sensors and Zigbee

Unit – III Real Time applications
DC Motor Interfacing, H-bridge concept and design and ultrasonic interfacing, Clockwise and anticlockwise control, Real time applications interfacing with robotic vehicle model, Real time applications interfacing with sensors and Robot

Unit – IV Li-Fi with Ardino
Introduction, Li-Fi based Data communication, Interfacing Li-Fi with Arduino, Application Development with Li-Fi.

Unit – V IOT –Configuration & Integration
Introduction to IoT & Scope of IoT, Web page creation, Data transmission from sensors, Configuration webpage ,Sensor data monitoring , Wireless Interfacing, Android mobile based device control, GSM interfacing and send SMS, Real time Application Development with GSM, Zigbee Interfacing Data transmission using zigbee, Real time applications interfacing with robotic vehicle.

Outcomes:
The students will be outfitted with hands on knowledge in IOT using ARDUINO. .
Upon completion of the program, the students will be able to

C01	Understand features of the Arduino platform
C02	Application development-Integrate with Zigbee
C03	Study and execute real time applications
C04	Application development -Li-Fi with Ardino
C05	Execute coding to gather and process data on the Arduino via the cloud.

Total Hours: 45

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OUTCOMES:
At the end of the course, the student should be able to:
- Realize basic elements in optical fibers, different modes and configurations.
- Analyze the transmission characteristics associated with dispersion and polarization techniques.
- Design optical sources and detectors with their use in optical communication system.
- Construct fiber optic receiver systems, measurements and coupling techniques.
- Design optical communication systems and its networks.

TEXT BOOKS:

1. P Chakrabarti, "Optical Fiber Communication", McGraw Hill Education (India)Private Limited, 2016 (UNIT I, II, III)
2. Gred Keiser,"Optical Fiber Communication", McGraw Hill Education (India) Private Limited. Fifth Edition, Reprint 2013. (UNIT I, IV, V)

REFERENCES:

1. John M.Senior, "Optical fiber communication", Pearson Education, second edition.2007.
2. Rajiv Ramaswami, "Optical Networks ", Second Edition, Elsevier , 2004.
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.
4. Govind P. Agrawal, "Fiber-optic communication systems", third edition, John Wiley & sons, 2004.

EC8791	EMBEDDED AND REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:
The student should be made to:
- Understand the concepts of embedded system design and analysis
- Learn the architecture and programming of ARM processor
- Be exposed to the basic concepts of embedded programming
- Learn the real time operating systems

UNIT I   INTRODUCTION TO EMBEDDEDSYSTEM DESIGN   9
Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT II   ARM PROCESSOR AND PERIPHERALS

                                                                              9

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT III   EMBEDDED PROGRAMMING   9

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 IV   REAL TIME SYSTEMS   9

Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronisation.

UNIT V   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. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

<div align="right">

TOTAL: 45   PERIODS

</div>

OUTCOMES:
At the end of the course, the student should 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
- Model real-time applications using embedded-system concepts

TEXT BOOKS:
1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)
2. Jane W.S.Liu," Real Time Systems", Pearson Education, Third Indian Reprint, 2003.(UNIT IV)

REFERENCES:
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4. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
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7. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.

IOT BASED SMART AGRICULTURE SYSTEM AND WEATHER FORECASTING

A PROJECT REPORT

Submitted by

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CHEMUDUGUNTA AJAY KUMAR (311819106007)

POTU GANGA MANOJ KUMAR (311819106016)
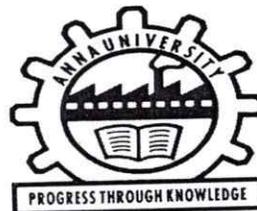
in partial fulfillment for the award of the degree

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BACHELOR OF ENGINEERING

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MAY 2023

i

ANNA UNIVERSITY: CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report **"IOT BASED SMART AGRICULTURE SYSTEM AND WEATHER FORECASTING"** is the bonafide work of **"AVULA SUNEEL (311819106005), CHEMUDUGUNTA AJAY KUMAR (311819106007), POTU GANGA MANOJ KUMAR (311819106016)** who carried out the project work under my supervision.

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Project Viva – Voce held on ___18-05-2023___

INTERNAL EXAMINER

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EXTERNAL EXAMINER

ii
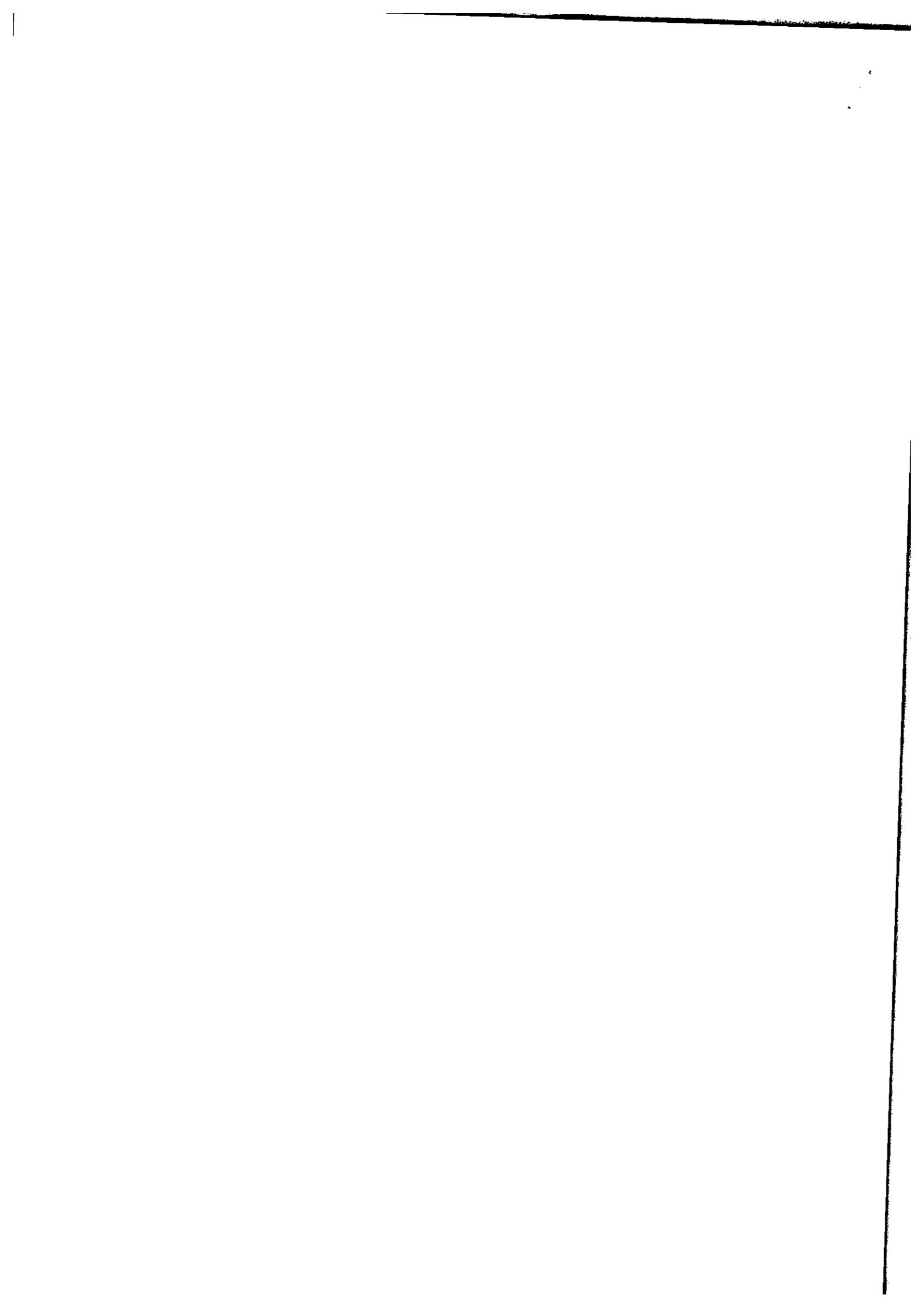
ABSTRACT:

In India, agriculture is the most essential occupation for most Indian families. Water is the most important resource for agriculture. Irrigation is a water supply method, but a lot of water can be wasted. In this regard, we proposed a project called IoT based Smart agriculture and weather forecasting system to save water and time. The proposed system uses various sensors such as temperature, humidity, soil moisture sensors and Rain Sensor to detect different parameters of the soil and automatically irrigate the land by turning the motor on and off based on the soil moisture value will be done. These collected parameters and engine status are displayed in the user's Android application. Based on data analysis humidity, temperature and precipitation can be considered as some of the climatic parameters. In this project, only the temperature and humidity is considered in the experimental analysis. DHT11 sensor which is a temperature/humidity sensor is used to collect data for the same. The temperature and humidity analysis of a particular region can be done by this sensor. Weather forecasts are attempts by meteorologists to predict weather conditions that are expected to be meteorological conditions at a later date.

KEY WORDS: IOT, Node MCU, Temperature Sensor, Soil Moisture Level, rain Sensor, Weather analysis

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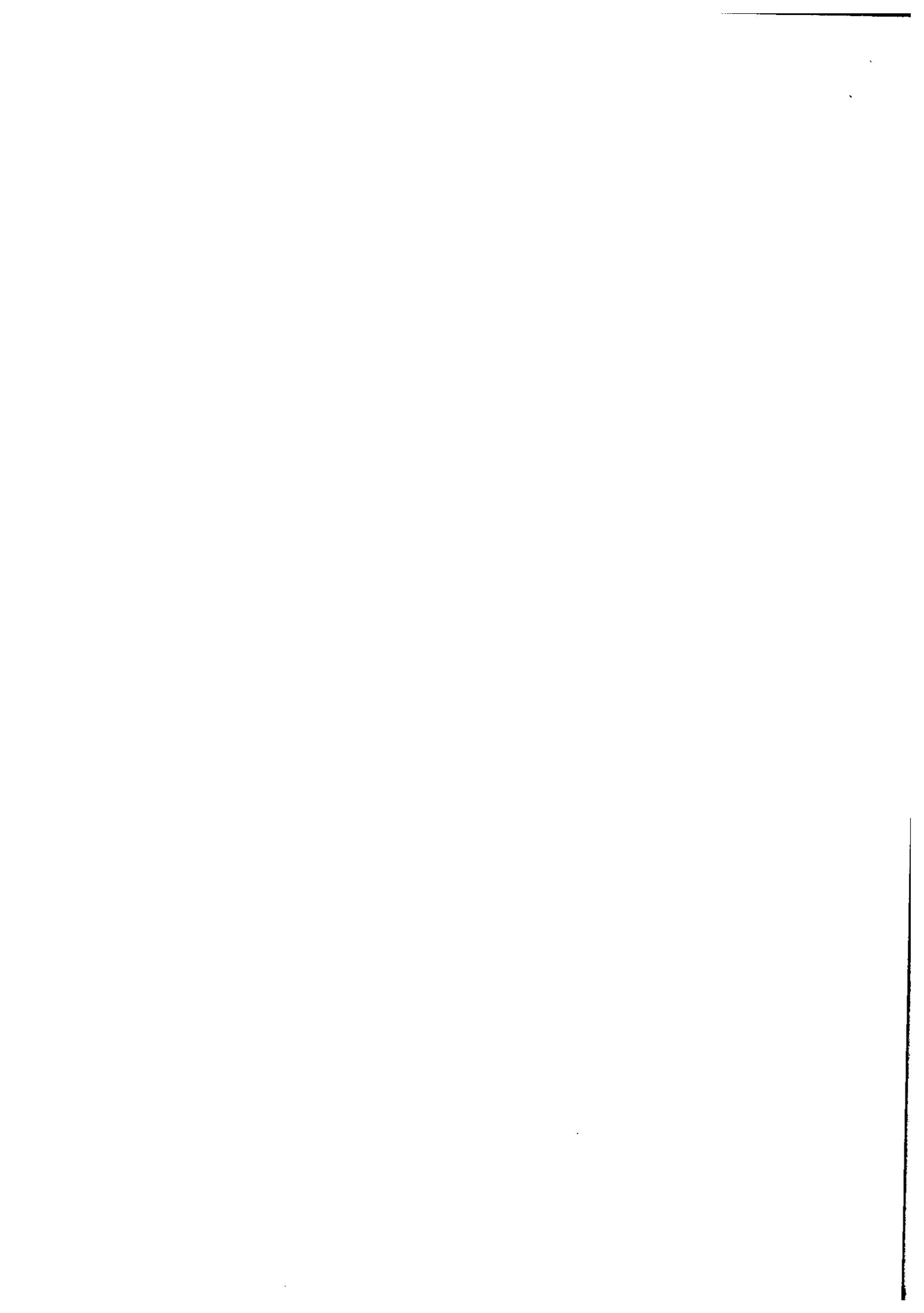
6.3. CONCLUSION:

Smart Farming IOT Based Agriculture Stick for Live Monitoring of Temperature and Soil Moisturehas been proposed using Node MCU Chip, Wifi Module, and various other Hardware Devices. The stick hashigh efficiency and accuracy in fetching the live data of temperature, humidity, and soil moisture. The IoT-based Agriculture stick being developed through this paper will help farmers in increasing the agriculture yield
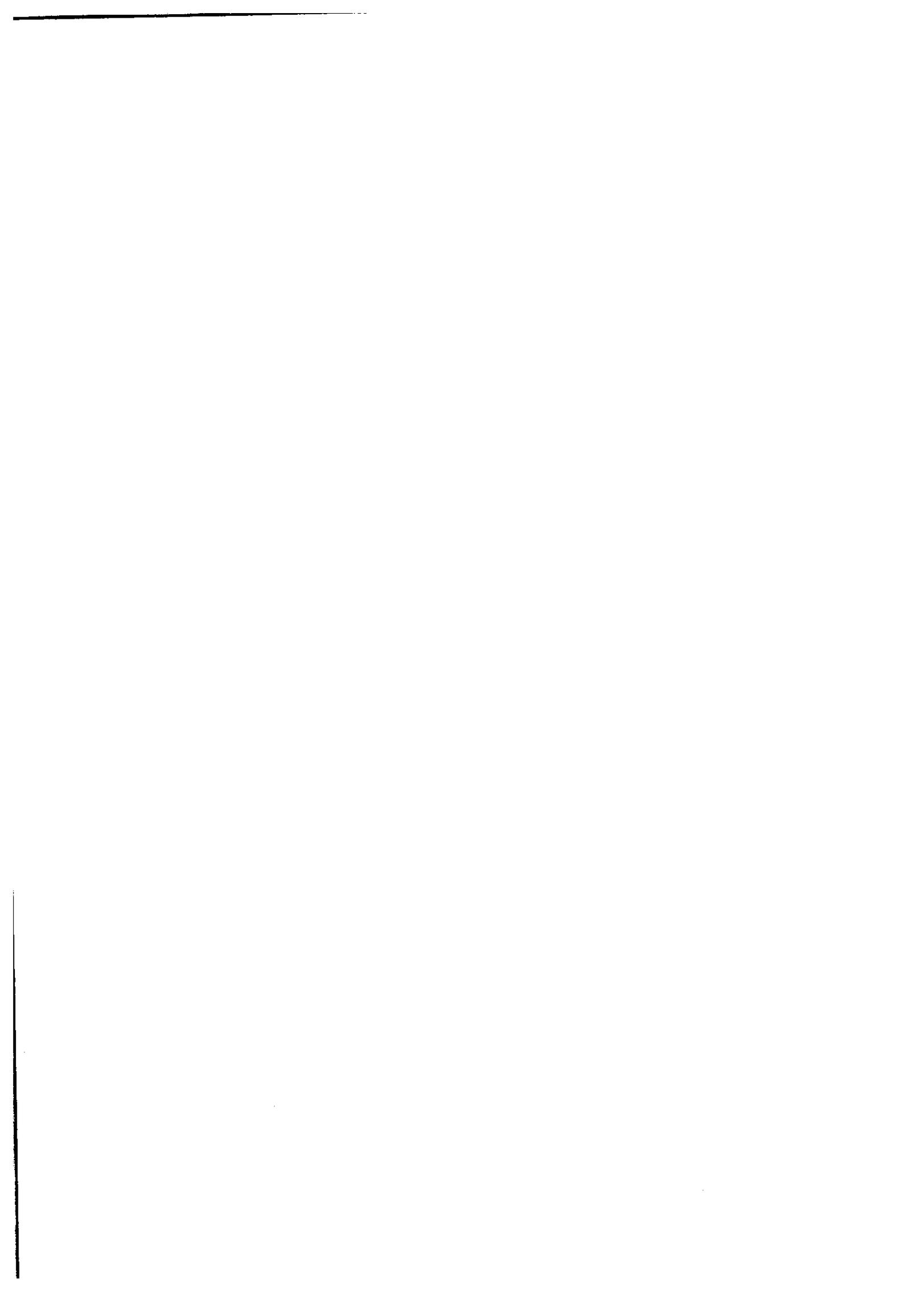
and take efficient care of food production as the stick will always provide a helping hand to farmers for gettingaccurate live feed of environmental temperature and soil moisture with accurate results. With the help of thesesystems, various problems faced by farmers in daily life are being solved to a greater extent. Therefore, this system avoids excessive irrigation, under irrigation, soil erosion, and reduces water wastage. The main advantage is that the action of the system can be changed depending on the situation (plants, climate, soil, etc.).

Through this program, agriculture, agricultural fields, parks, gardens, golf courses can be measured. Therefore,this program is cheaper and more efficient compared to other types of automation systems. For largerapplications, higher sensitivity can be performed in large areas of agricultural land. A soil moisture levelmonitoring system was developed and the project provided an opportunity to study existing systems, as well astheir features and constraints. The proposed system can be used to turn off / off the water spray according to soilmoisture levels thus making the irrigation process one of the most time-consuming agricultural activities.

Agriculture is one of the biggest uses of water.

OUTCOMES:
At the end of the course, the student should be able to:
- Realize basic elements in optical fibers, different modes and configurations.
- Analyze the transmission characteristics associated with dispersion and polarization techniques.
- Design optical sources and detectors with their use in optical communication system.
- Construct fiber optic receiver systems, measurements and coupling techniques.
- Design optical communication systems and its networks.

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EC8791	EMBEDDED AND REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:
The student should be made to:
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- Be exposed to the basic concepts of embedded programming
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UNIT I   INTRODUCTION TO EMBEDDEDSYSTEM DESIGN   9

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UNIT IV   REAL TIME SYSTEMS   .   9

Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronisation.

UNIT V   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. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

TOTAL: 45   PERIODS

OUTCOMES:
At the end of the course, the student should 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
- Model real-time applications using embedded-system concepts

TEXT BOOKS:
1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)
2. Jane W.S.Liu," Real Time Systems", Pearson Education, Third Indian Reprint, 2003.(UNIT IV)

REFERENCES:
1. Lyla B.Das, "Embedded Systems : An Integrated Approach" Pearson Education, 2013.
2. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.
3. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
4. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
5. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997
6. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
7. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.

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Semester -6

Value Added Course on
IOT USING ARDUINO

L	T	P	C
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Objectives:

- To expose student and gain knowledge about Arduino technology with IOT
- To Program and construct applications using Arduino using a number of different sensors and IOT

Unit – I Introduction to Arduino
Embedded processing portfolio, Architecture and hardware organization of Arduino, Configuring GPIO and Clock systems, Real time applications using GPIO configuration, LCD interfacing, Technical explanation ADC, Configuring ADC, Real time applications using Sensors

Unit – II Interfacing with Zigbee
Bluetooth Interfacing, Android mobile based device control ,GSM interfacing and send SMS, Real time Application Development with GSM ,Zigbee Interfacing, Data transmission using zigbee, Real time applications interfacing with sensors and Zigbee

Unit – III Real Time applications
DC Motor Interfacing, H-bridge concept and design and ultrasonic interfacing, Clockwise and anticlockwise control, Real time applications interfacing with robotic vehicle model, Real time applications interfacing with sensors and Robot

Unit – IV Li-Fi with Ardino
Introduction, Li-Fi based Data communication, Interfacing Li-Fi with Arduino, Application Development with Li-Fi.

Unit – V IOT –Configuration & Integration
Introduction to IoT & Scope of IoT, Web page creation, Data transmission from sensors, Configuration webpage ,Sensor data monitoring , Wireless Interfacing, Android mobile based device control, GSM interfacing and send SMS, Real time Application Development with GSM, Zigbee Interfacing Data transmission using zigbee, Real time applications interfacing with robotic vehicle.

Outcomes:
The students will be outfitted with hands on knowledge in IOT using ARDUINO. .
Upon completion of the program, the students will be able to

C01	Understand features of the Arduino platform
C02	Application development-Integrate with Zigbee
C03	Study and execute real time applications
C04	Application development -Li-Fi with Ardino
C05	Execute coding to gather and process data on the Arduino via the cloud.

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Total Hours: 45

Machine Learning Approach For ECG Classification Using Energy Efficient FPGA Processor

A PROJECT REPORT

Submitted by

SALMAN. S (311819106303)

JAHANGEER NADIR KHAN.P (311819106009)

NAVINASH. S (311819106301)

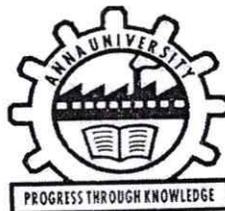*in partial fulfillment for the award of the degree*

of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING
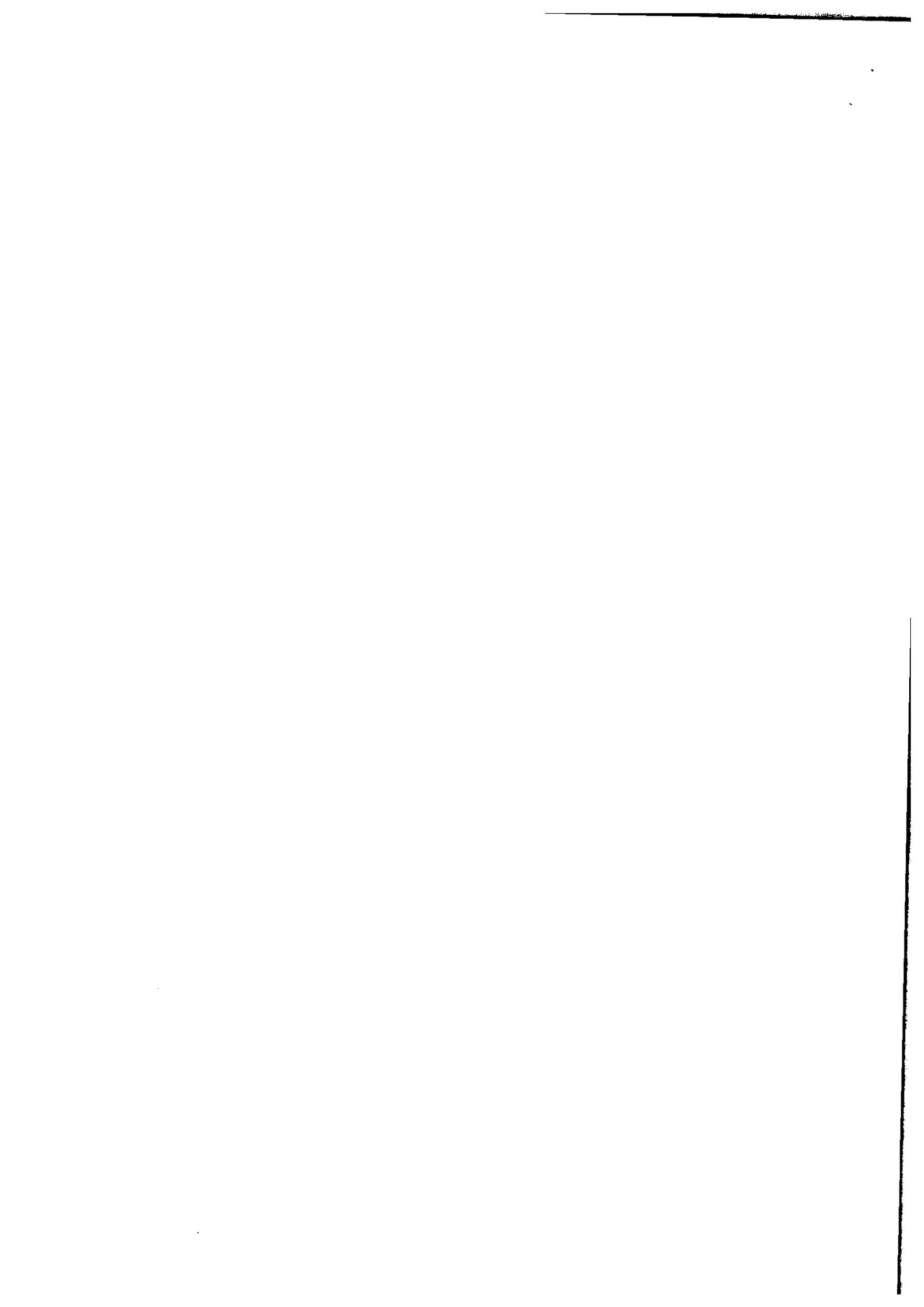
MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

PRINCIPAL
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Siecot - IT Highway Egattur,
Chenai - 603103.

ANNA UNIVERSITY : CHENNAI 600025

MAY 2023

ANNA UNIVERSITY : CHENNAI 600025
BONAFIED CERTIFICATE

Certified that this project report "ACCURATE MACHINE LEARNING APPROACH FOR ECG CLASSIFICATION USING ENERGY EFFICIENT FPGA PROCESSOR is the bonafide work of "SALMAN. S (311819106303), JAHANGEER NADIR KHAN.P(311819106009) & NAVINASH.S," arecarried out this project work under my supervision.

Dr. I. MANJU

HEAD OF THE DEPARTMENT

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Chennai - 603103

Dr. I. MANJU

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Chenai - 603103.

Project Viva – Voce held on 18 /05/ 2023

INTERNAL EXAMINER

EXTERNAL EXAMINER
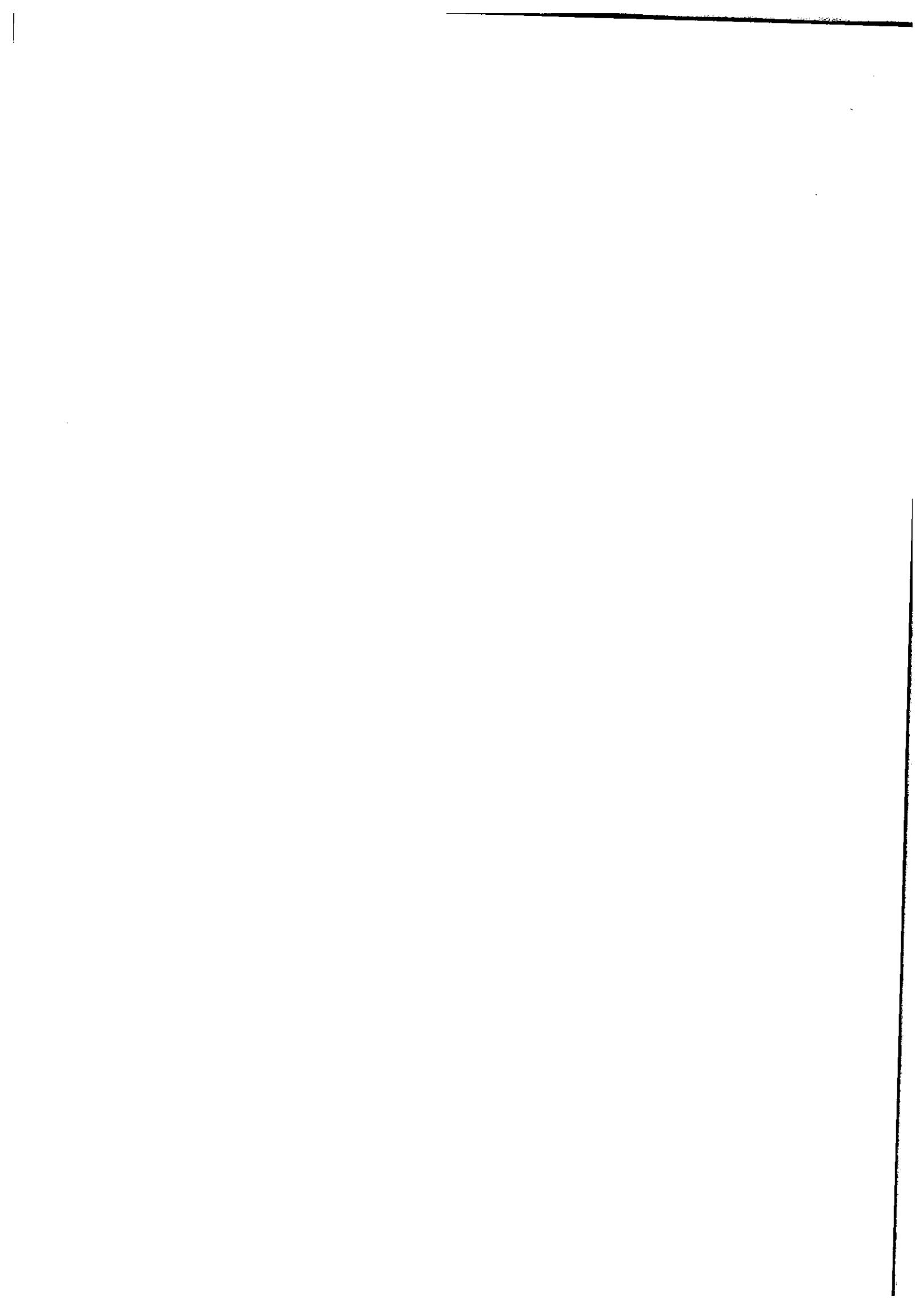
ABSTRACT

A fully-mapped field programmable gate array (FPGA) accelerator is proposed for artificial intelligence (AI)-based analysis of electrocardiogram (ECG). It consists of a fully mapped heart rate estimator, which constitute a complementary dual-function analysis. This project proposes a classifier to create a specific ML-ANN to classify the electrogram (ECG). ECGs used here include electrocardiogram, electroencephalogram and electromyography. The pipelined structure is designed with a register in the middle to facilitate easy binary data transfer. A 1-D ANN using a classifier to categorize ECG signals implemented on Xilinx platform with FPGA. In addition, the 1-D ANN proposed classifier operates very efficiently due to the use of a tristate buffer in the multiplexer and the substitution of the shift for the multiplier, resulting in a resource-efficient a classifier. This system including a reconfigurable ANN inference architecture for reducing energy consumption while maintaining classification accuracy. A reconfigurable on-chip learning architecture for improving the classification accuracy against patent-to-patient variability, and a dual-purpose binary encoding scheme of ECG heartbeats for further reducing the energy consumption. This project is implemented with MATLAB software.
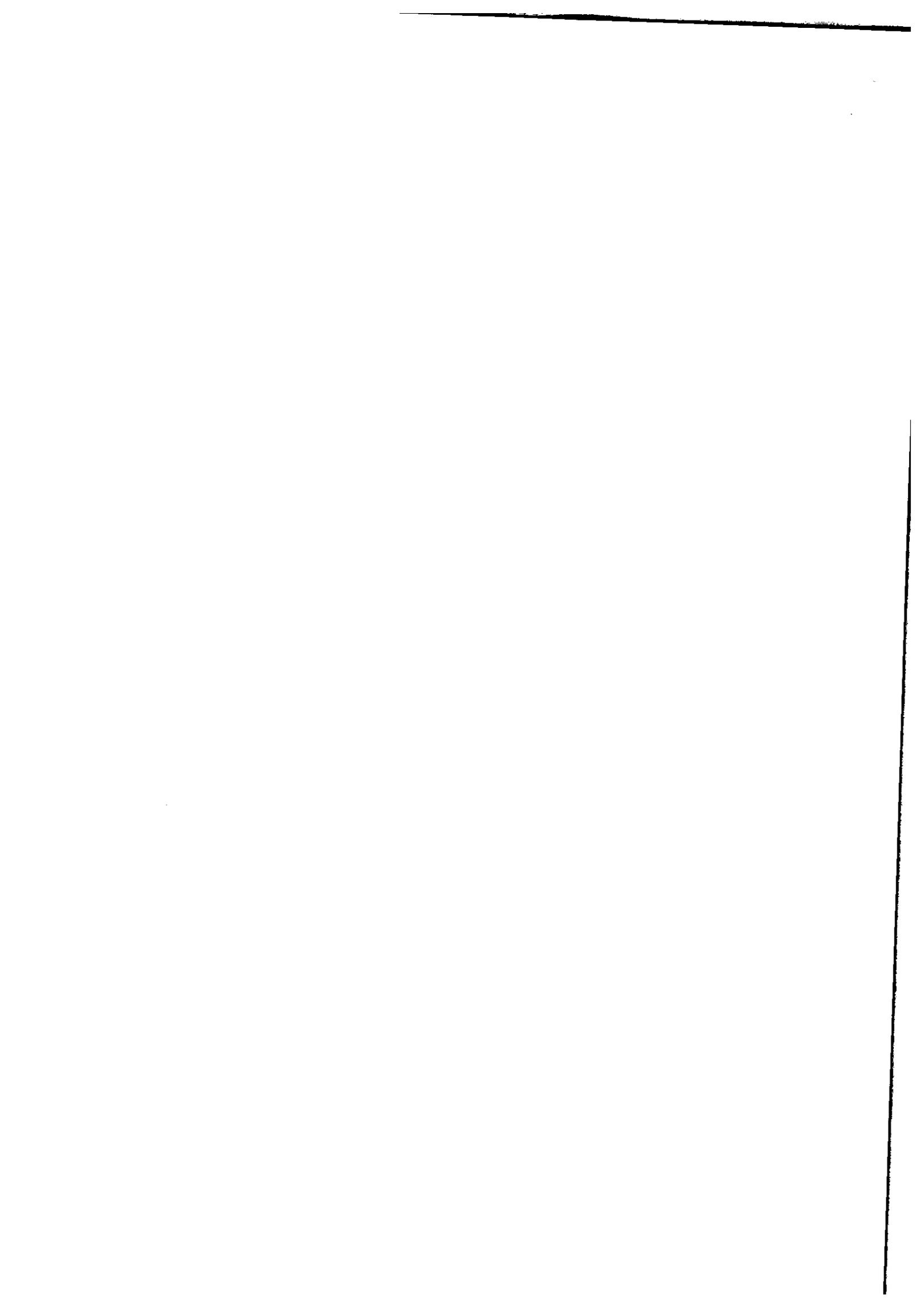
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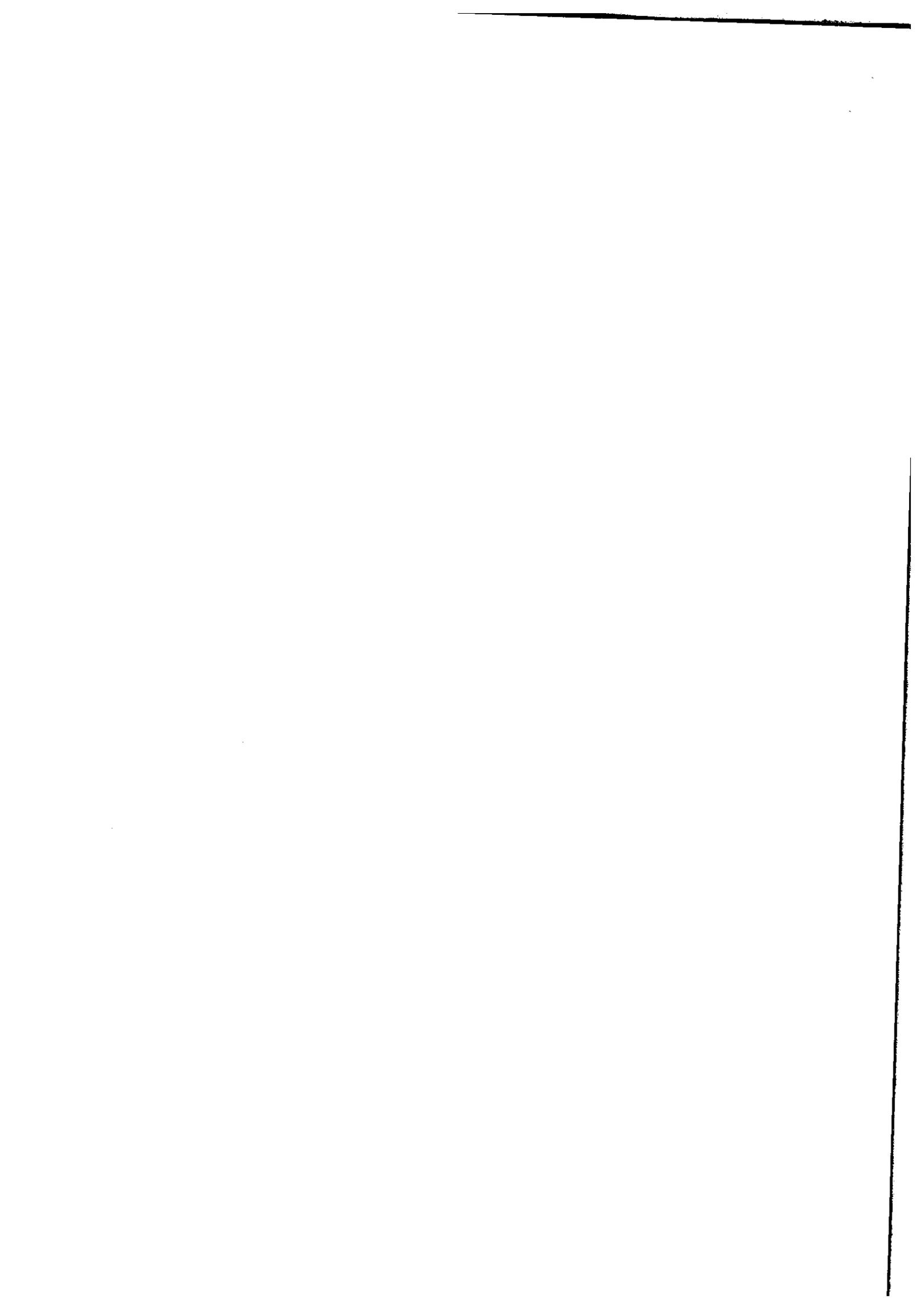
CHAPTER-6

CONCLUSION

6.2 CONCLUSION

This project proposes a classifier to create a specific ML-ANN to classify the electrogram (ECG). A Machine Learning based artificial neural network classifier is designed successfully to solve the ECG classification problem. The complexity of the ECG classifier is reduced using two stage Fast Fourier Transform approach. The DWT based Feature extraction has achieved high accuracy and sensitivity. The proposed classifier performance is compared with existing unsupervised classifiers and found that the proposed classifier performance is better than unsupervised classifiers. The proposed Machine learning approach model is validated using Spartan 6E FPGA Controller board. ML-ANN classifier, this will increase the performance parameters such as Accuracy, Sensitivity and Specificity.

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	L	T	P	C

EC8093   **DIGITAL IMAGE PROCESSING**

L T P C
3 0 0 3

OBJECTIVES:
- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

UNIT I   DIGITAL IMAGE FUNDAMENTALS   9
Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II   IMAGE ENHANCEMENT   9
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, Homomorphic filtering, Color image enhancement.

UNIT III   IMAGE RESTORATION   9
Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV   IMAGE SEGMENTATION   9
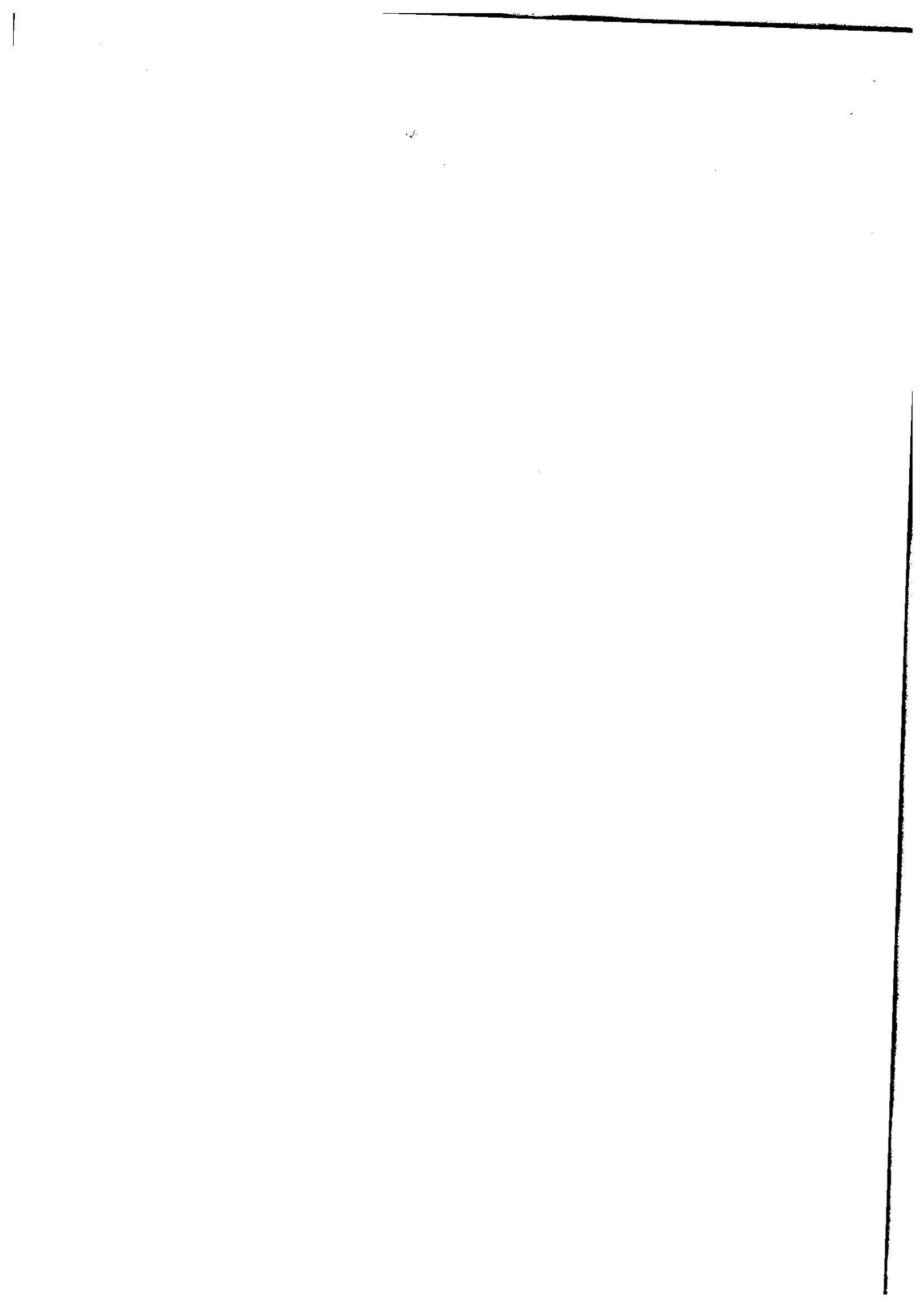Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V   IMAGE COMPRESSION AND RECOGNITION   9
Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS

EC8073	MEDICAL ELECTRONICS	L	T	P	C
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OBJECTIVES:
The student should be made:
- To gain knowledge about the various physiological parameters both electrical and non electrical and the methods of recording and also the method of transmitting these parameters
- To study about the various assist devices used in the hospitals
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING   9
Sources of bio medical signals, Bio-potentials, Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, typical waveforms and signal characteristics

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER   9
MEASUREMENT
pH, PO2, PCO2, Colorimeter, Blood flow meter, Cardiac output, respiratory, blood pressure, temperature and pulse measurement, Blood Cell Counters.

UNIT III ASSIST DEVICES   9
Cardiac pacemakers, DC Defibrillator, Dialyser, Ventilators, Magnetic Resonance Imaging Systems, Ultrasonic Imaging Systems.

UNIT IV PHYSICAL MEDICINE AND BIOTELEMETRY   9
Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy, Biotelemetry.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION   9
Telemedicine, Insulin Pumps, Radio pill, Endomicroscopy, Brain machine interface, Lab on a chip.

TOTAL:45 PERIODS

OUTCOMES:
On successful completion of this course, the student should be able to:
- Know the human body electro- physiological parameters and recording of bio-potentials
- Comprehend the non-electrical physiological parameters and their measurement – body temperature, blood pressure, pulse, blood cell count, blood flow meter etc.
- Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators
- Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies , and bio-telemetry principles and methods
- Know about recent trends in medical instrumentation

TEXT BOOK:
1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007. (UNIT I – V)

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REFERENCES:
1. Khandpur, R.S., "Handbook of Biomedical Instrumentation", TATA Mc Graw-Hill, New Delhi, 2003.
2. John G.Webster, "Medical Instrumentation Application and Design", 3rd Edition, Wiley India
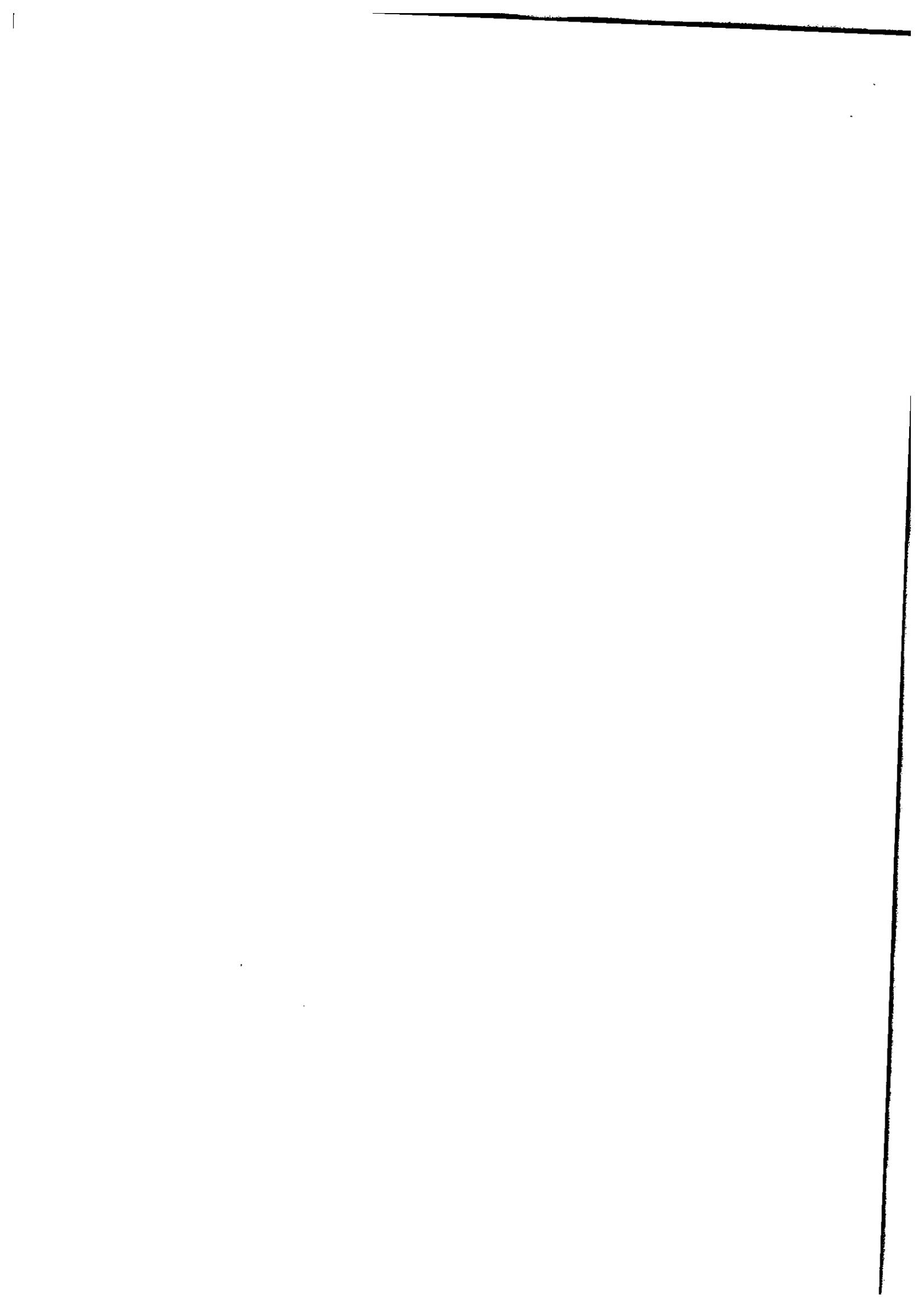
UNIT IV   MICROCONTROLLER   9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V   INTERFACING MICROCONTROLLER   9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the students should be able to:
- Understand and execute programs based on 8086 microprocessor.
- Design Memory Interfacing circuits.
- Design and interface I/O circuits.
- Design and implement 8051 microcontroller based systems.

TEXT BOOKS:
1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007. (UNIT I-III)
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCES:
1. Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012
2. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

EC8095	VLSI DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:
- Study the fundamentals of CMOS circuits and its characteristics.
- Learn the design and realization of combinational & sequential digital circuits.
- Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed
- Learn the different FPGA architectures and testability of VLSI circuits.

**UNIT I   INTRODUCTION TO MOS TRANSISTOR**   9

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.

UNIT II   COMBINATIONAL MOS LOGIC CIRCUITS   9

Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls.
Power: Dynamic Power, Static Power, Low Power Architecture.

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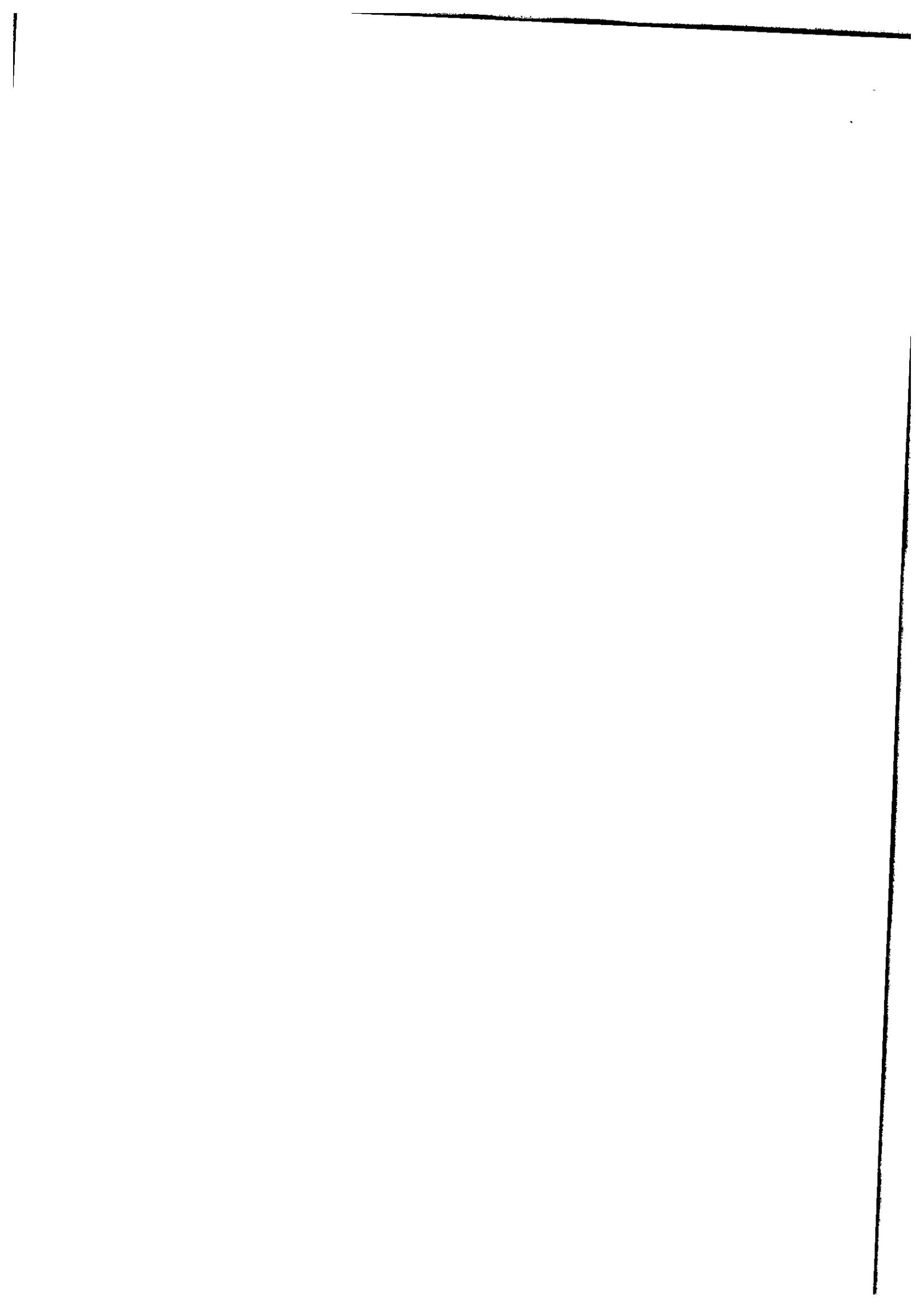
UNIT III SEQUENTIAL CIRCUIT DESIGN

9

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable Sequential Circuits.

Timing Issues : Timing Classification Of Digital System, Synchronous Design.

UNIT IV DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM

9

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.

Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

UNIT V IMPLEMENTATION STRATEGIES AND TESTING

9

FPGA Building Block Architectures, FPGA Interconnect Routing Procedures. Design for Testability: *Ad Hoc* Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan.

TOTAL : 45 PERIODS

OUTCOMES:
UPON COMPLETION OF THE COURSE, STUDENTS SHOULD be ABLE TO
- Realize the concepts of digital building blocks using MOS transistor.
- Design combinational MOS circuits and power strategies.
- Design and construct Sequential Circuits and Timing systems.
- Design arithmetic building blocks and memory subsystems.
- Apply and implement FPGA design flow and testing.

TEXT BOOKS:
1. Neil H.E. Weste, David Money Harris "CMOS VLSI Design: A Circuits and Systems Perspective", 4th Edition, Pearson , 2017 (UNIT I,II,V)
2. Jan M. Rabaey ,Anantha Chandrakasan, Borivoje. Nikolic, "Digital Integrated Circuits:A Design perspective", Second Edition , Pearson , 2016.(UNIT III,IV)

REFERENCES
1. M.J. Smith, "Application Specific Integrated Circuits", Addisson Wesley, 1997
2. Sung-Mo kang, Yusuf leblebici, Chulwoo Kim "CMOS Digital Integrated Circuits:Analysis & Design",4th edition McGraw Hill Education,2013
3. Wayne Wolf, "Modern VLSI Design: System On Chip", Pearson Education, 2007
4. R.Jacob Baker, Harry W.LI., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India 2005.
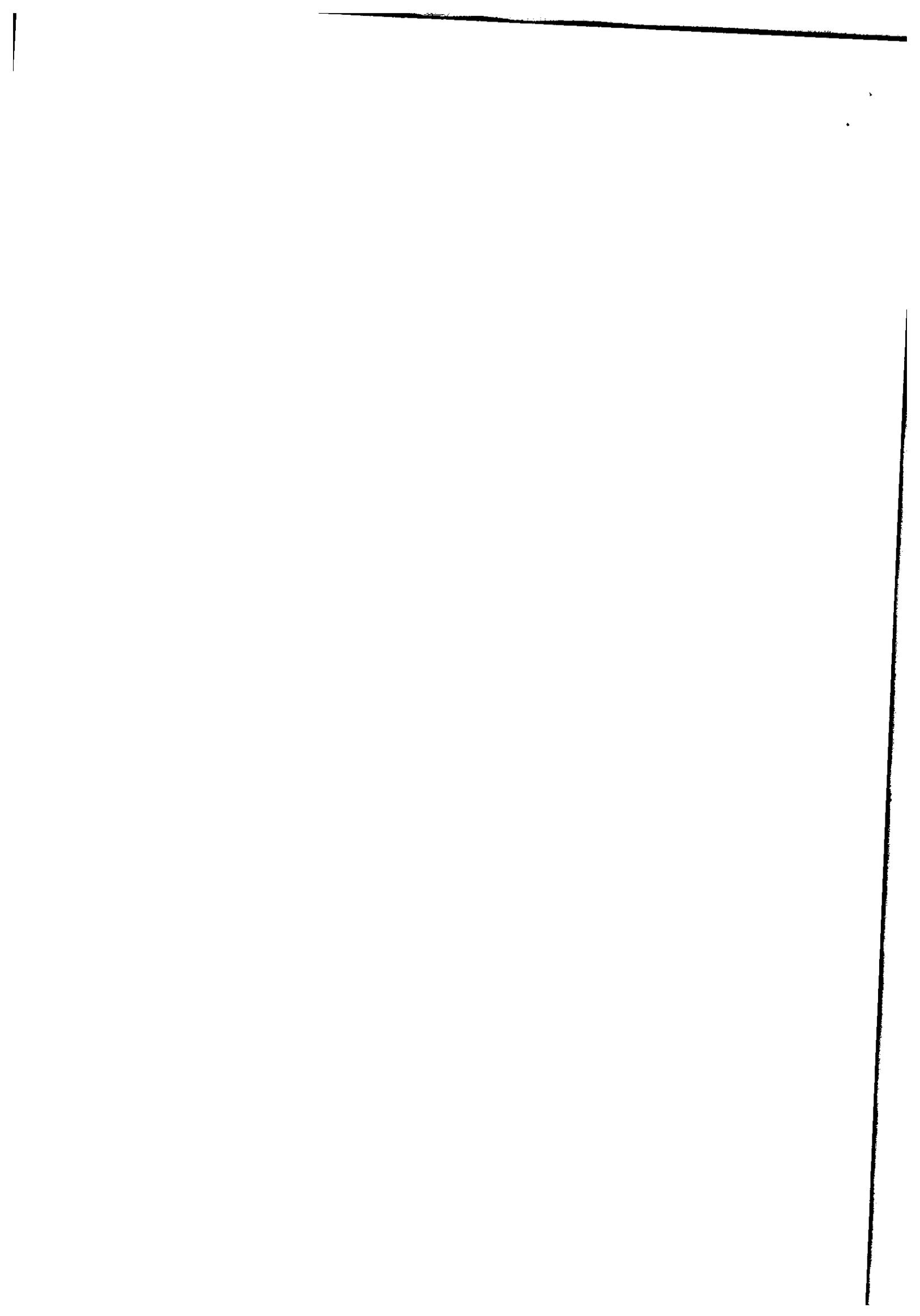
	T	**P**	**C**
EC8652 WIRELESS COMMUNICATION	3	0	3

OBJECTIVES:
- To study the characteristic of wireless channel
- To understand the design of a cellular system
- To study the various digital signaling techniques and multipath mitigation techniques
- To understand the concepts of multiple antenna techniques

SMART ROBOT

A PROJECT REPORT

Submitted by

SYED AAKHIB MOHAMMED	(311819106022)
MOHAMMED TAHEER	(311819106013)
MOHSIN KHAN	(311819106014)

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING
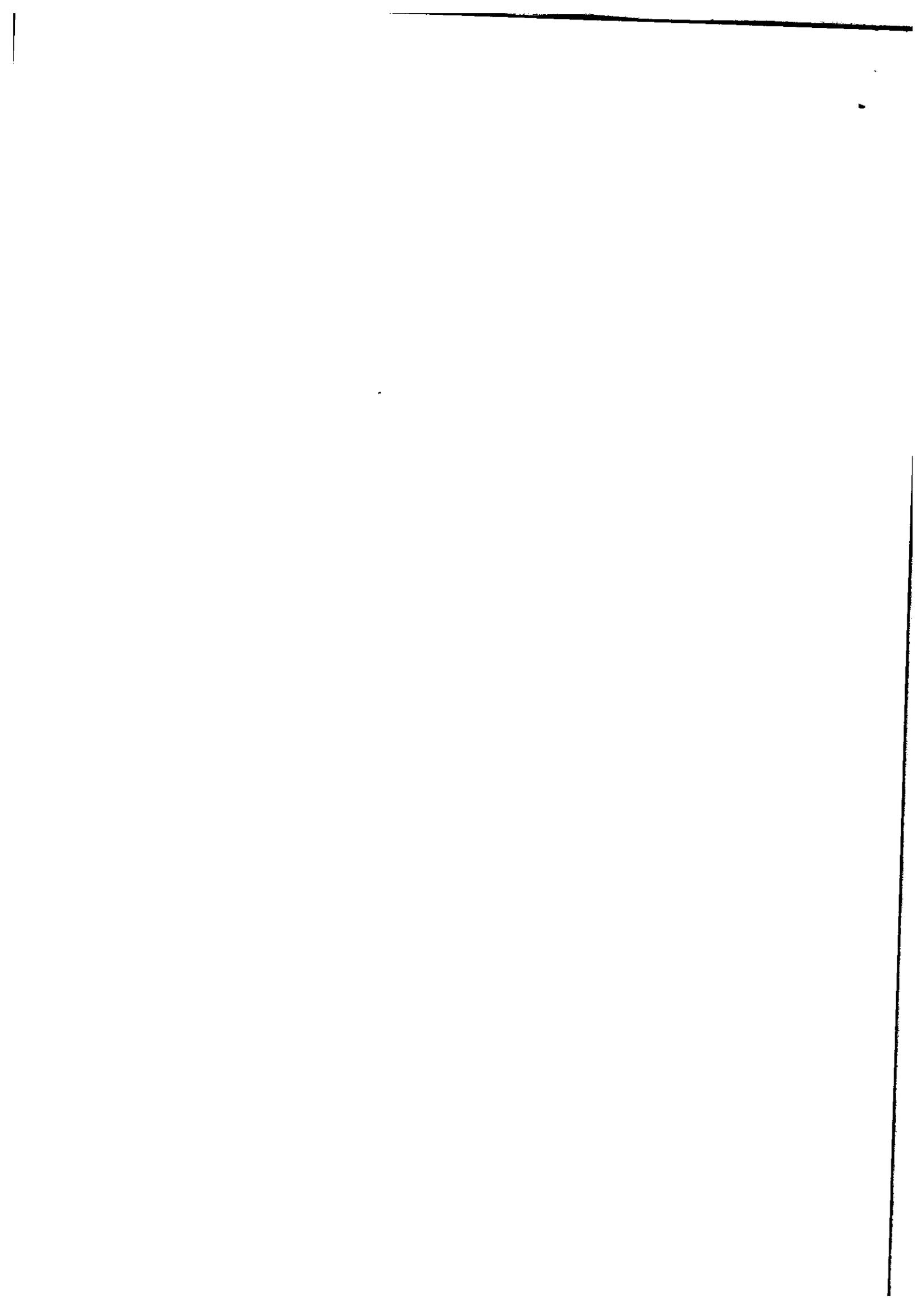
IN

ELECTRONICS AND COMMUNICATION ENGINEERING

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

ANNA UNIVERSITY: CHENNAI 600025

MAY 2023

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ANNA UNIVERSITY: CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report **"SMART ROBOT"** is the bonafide work of

"SYED AAKHIB MOHAMMED (311819106022), MOHAMMED TAHEER (311819106013) & MOHSIN KHAN (311819106014) who carried out the project work under my supervision.

SIGNATURE

Dr. I. MANJU

HEAD OF THE DEPARTMENT

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34, Siruseri IT Park, OMR,
Chennai - 603103

SIGNATURE

Mr. M. KAMARAJAN

SUPERVISOR /ASSISTANT PROFESSOR

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Project Viva – Voce held on 18 - 05 - 23

INTERNAL EXAMINER

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EXTERNAL EXAMINER

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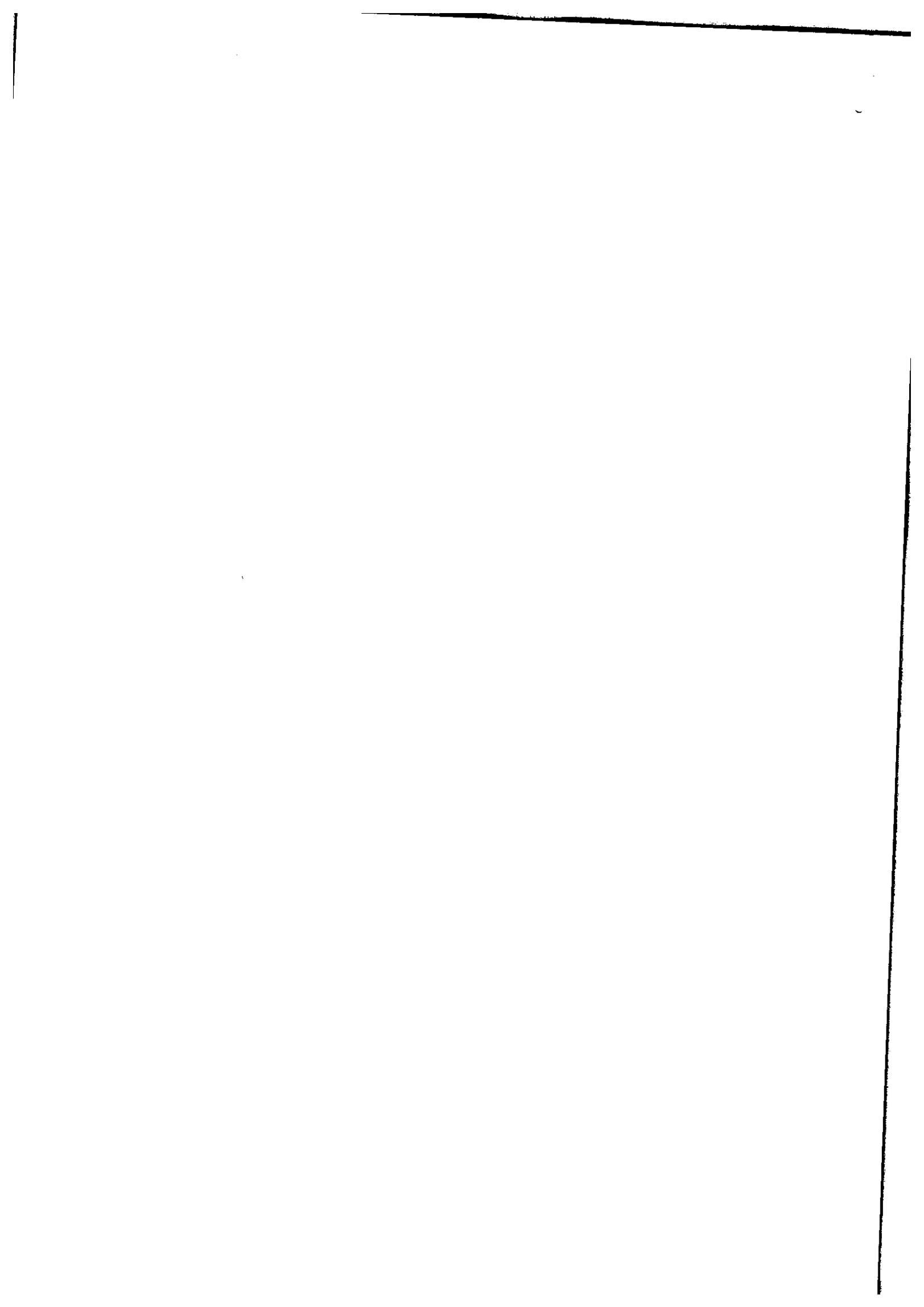
ABSTRACT

In recent years, robotic technology has been focused to develop on wide range of applications from military to civil and industrial. Among them, wheeled mobile robot is the most common type of robot that is developed for consumer purpose. In this the robot will be made to serve the people for their comfort at home. Using artificial intelligence and machine learning the robot is designed to create a smart robot which can be controlled by using a mobile phone application on the mobile phone using the app. This is the very next evolution of smart home. Using the Arduino uno and app the robot is made and can be controlled using the application on the mobile phone for the personal needs.

KEYWORDS: MACHINE LEARNING, ROBOT, MOBILE APP.

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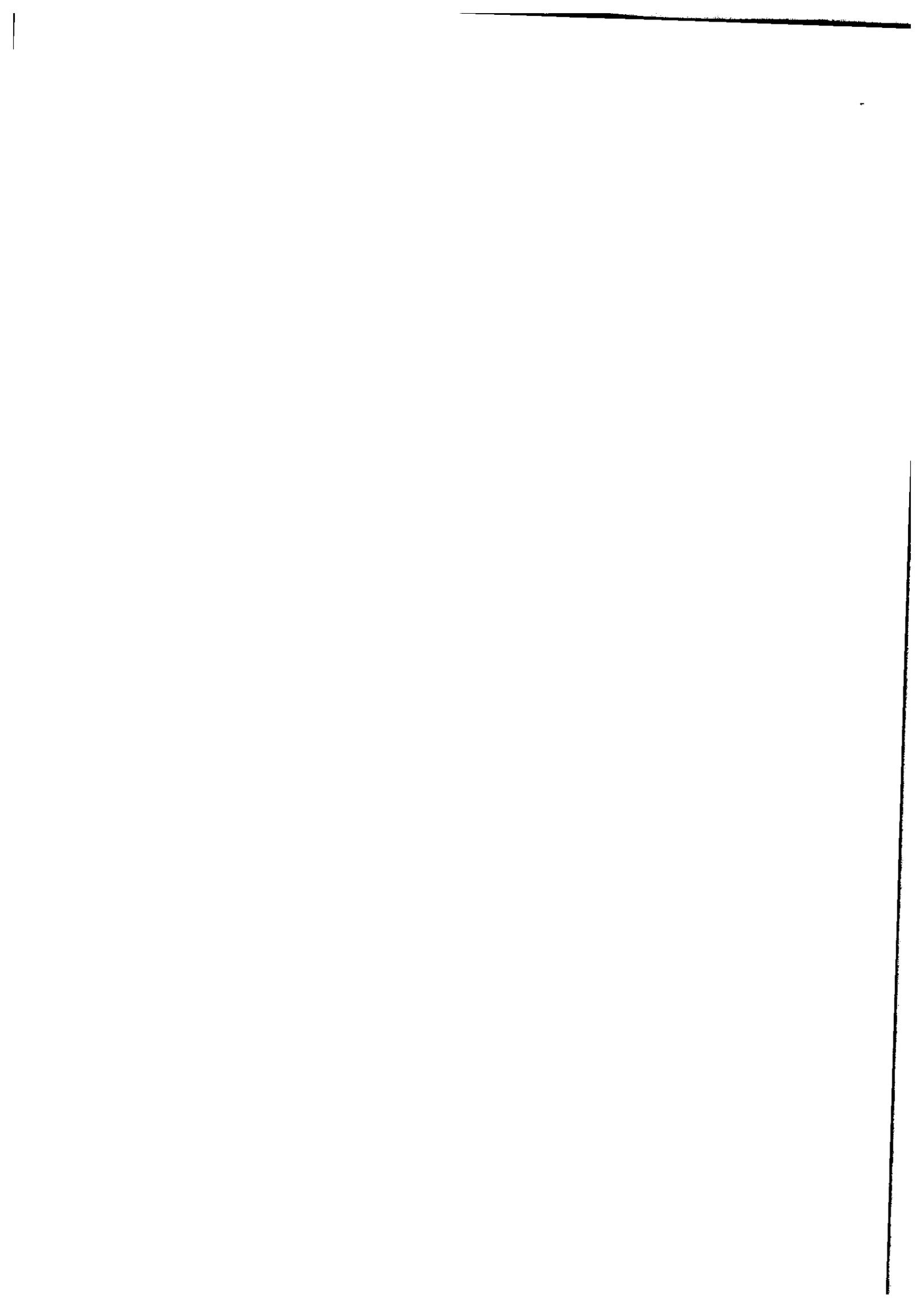
CHAPTER 6

6.1. Conclusion

The line following robot is automobile system that has ability to recognize it's path , move and change the robot's position toward the line in the best way to remain in track. This project report presents a photodiode sensor based line follower robot design of 200gm weigh which always directs along the black line on white surface.The electromechenical robot dimension is $192\times100\times70$ mm^3 with max rpm 180 at no load and frictionless condition. The minimum turning radius for the system is 100mm at velocity of 24.2 cm/s. The robot is able to detect it's path in case it is out of path.

The line following robot project challenged the group to cooperate, communicate, and expand understanding of electronics, mechanical systems, and their integration with programming. The successful completion of every task demonstrated the potential of mechatronic systems and a positive group dynamic.

6.2. Future Work

In the process of development of the line follower, most of the useful feature is identified and many of them was implemented . But due to the time limitations and other factor some of these cannot be added.

. So the development features in brief:

- Use of color sensor.
- Use of ccd camera for better recognition and precise tracking the path..

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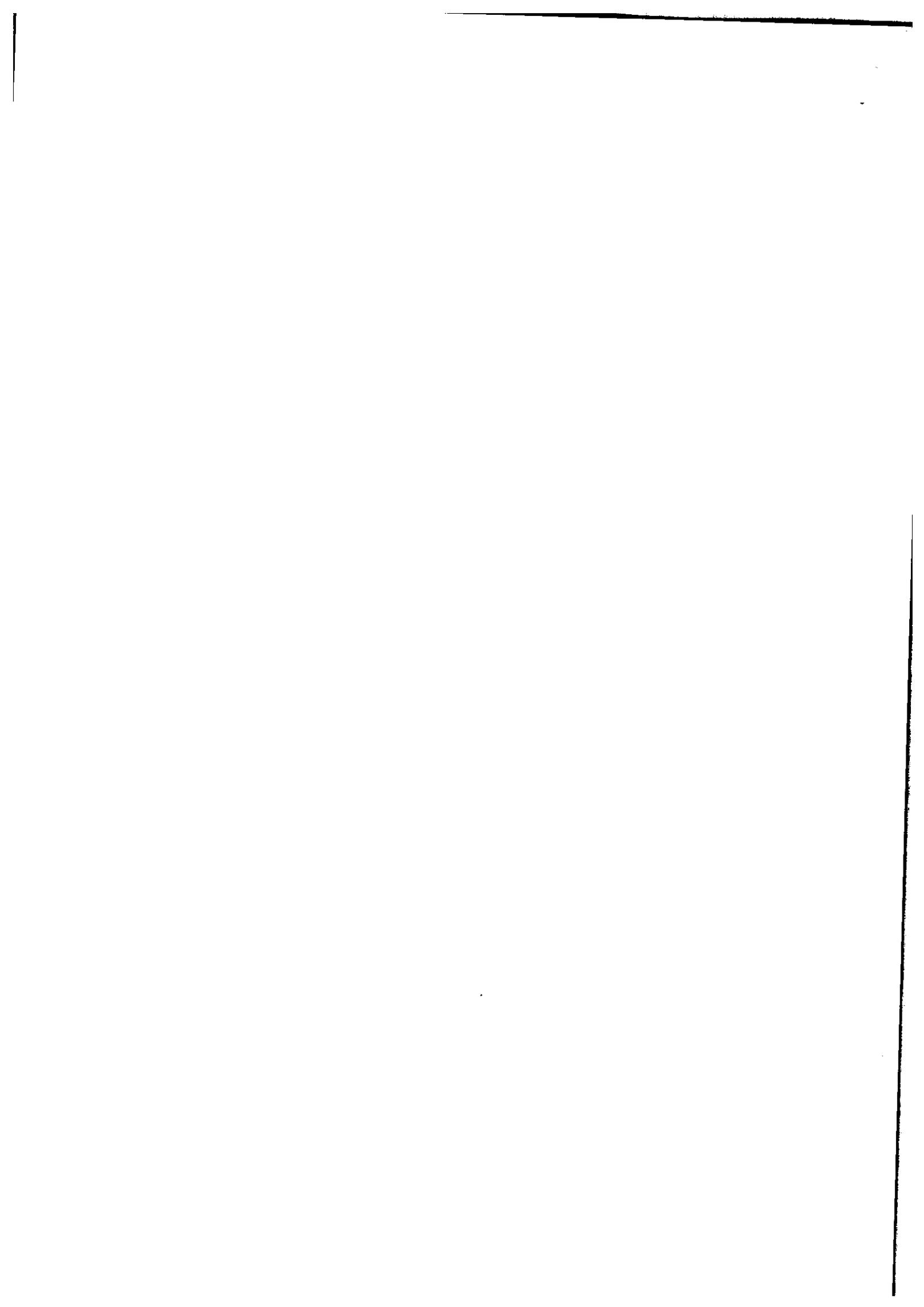
3. Rogers, B., Adams, J. & Pennathur, S. "Nanotechnology: Understanding Small Systems". CRC Press, 2014

| BE8254 | BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING | L T P C
3 0 0 3 |

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

UNIT I   AC CIRCUITS AND POWER SYSTEMS   9

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

UNIT II   TRANSFORMER   9

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

UNIT III   DC MACHINES   9

Introduction – Constructional Features– Motoring and generation principle - Emf And Torque equation – Circuit Model – Methods of Excitation and magnetisation characteristics – Starting and Speed Control – Universal Motor

UNIT IV   AC MACHINES   9

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

UNIT V   MEASUREMENT AND INSTRUMENTATION   9

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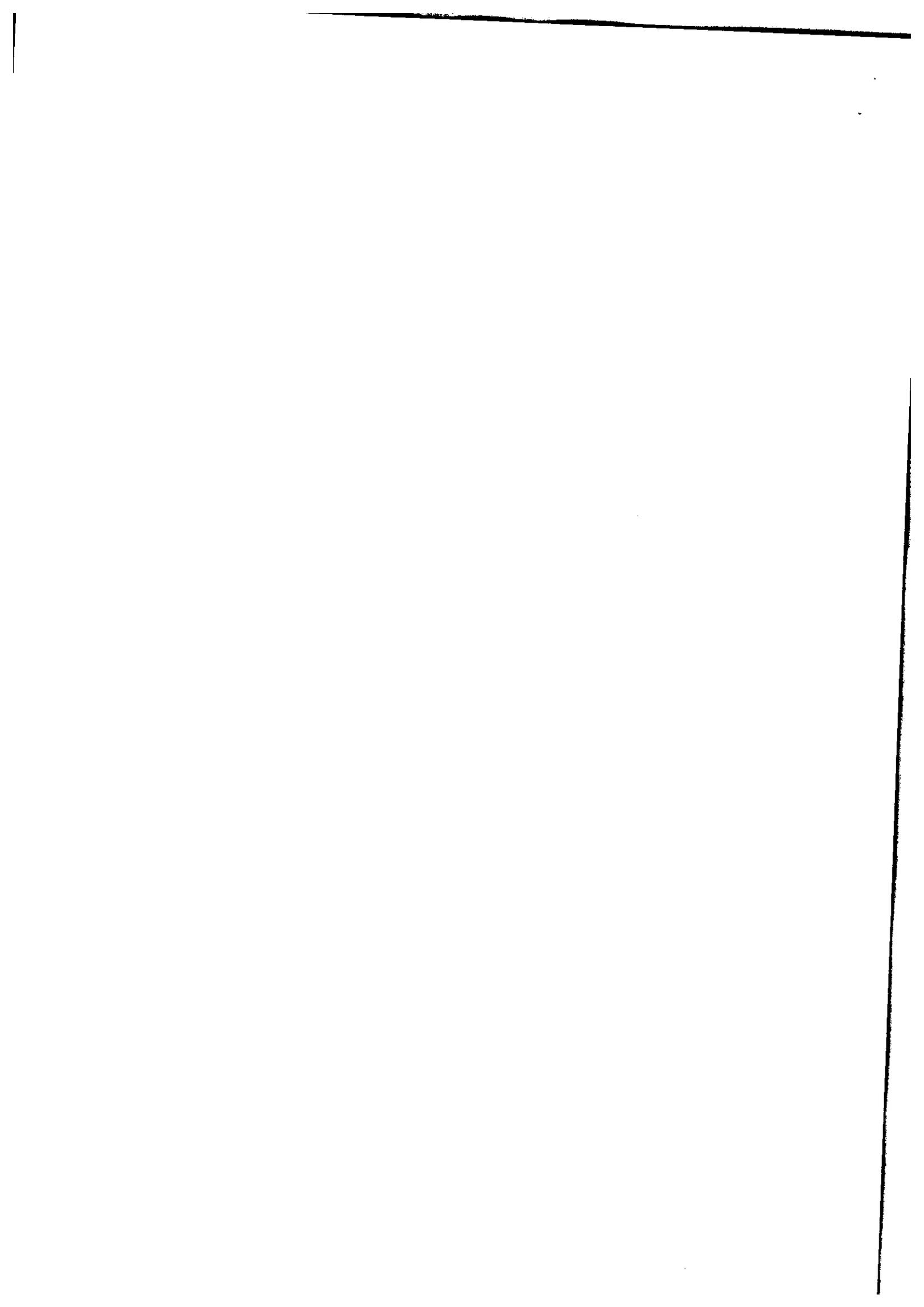1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint ,2016
2. Giorgio Rizzoni, "Principles and Applications of Electrical Engineering", McGraw Hill Education(India) Private Limited, 2010
3. S.K.Bhattacharya "Basic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

REFERENCES:
1. Del Toro ,"Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2015.

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Semester -6

Value Added Course on
IOT USING ARDUINO

Objectives:
- To expose student and gain knowledge about Arduino technology with IOT
- To Program and construct applications using Arduino using a number of different sensors and IOT

Unit – I Introduction to Arduino
Embedded processing portfolio, Architecture and hardware organization of Arduino, Configuring GPIO and Clock systems, Real time applications using GPIO configuration, LCD interfacing, Technical explanation ADC, Configuring ADC, Real time applications using Sensors

Unit – II Interfacing with Zigbee
Bluetooth Interfacing, Android mobile based device control ,GSM interfacing and send SMS, Real time Application Development with GSM ,Zigbee Interfacing, Data transmission using zigbee, Real time applications interfacing with sensors and Zigbee

Unit – III Real Time applications
DC Motor Interfacing, H-bridge concept and design and ultrasonic interfacing, Clockwise and anticlockwise control, Real time applications interfacing with robotic vehicle model, Real time applications interfacing with sensors and Robot

Unit – IV Li-Fi with Ardino
Introduction, Li-Fi based Data communication, Interfacing Li-Fi with Arduino, Application Development with Li-Fi.

Unit – V IOT –Configuration & Integration
Introduction to IoT & Scope of IoT, Web page creation, Data transmission from sensors, Configuration webpage ,Sensor data monitoring , Wireless Interfacing, Android mobile based device control, GSM interfacing and send SMS, Real time Application Development with GSM, Zigbee Interfacing Data transmission using zigbee, Real time applications interfacing with robotic vehicle.
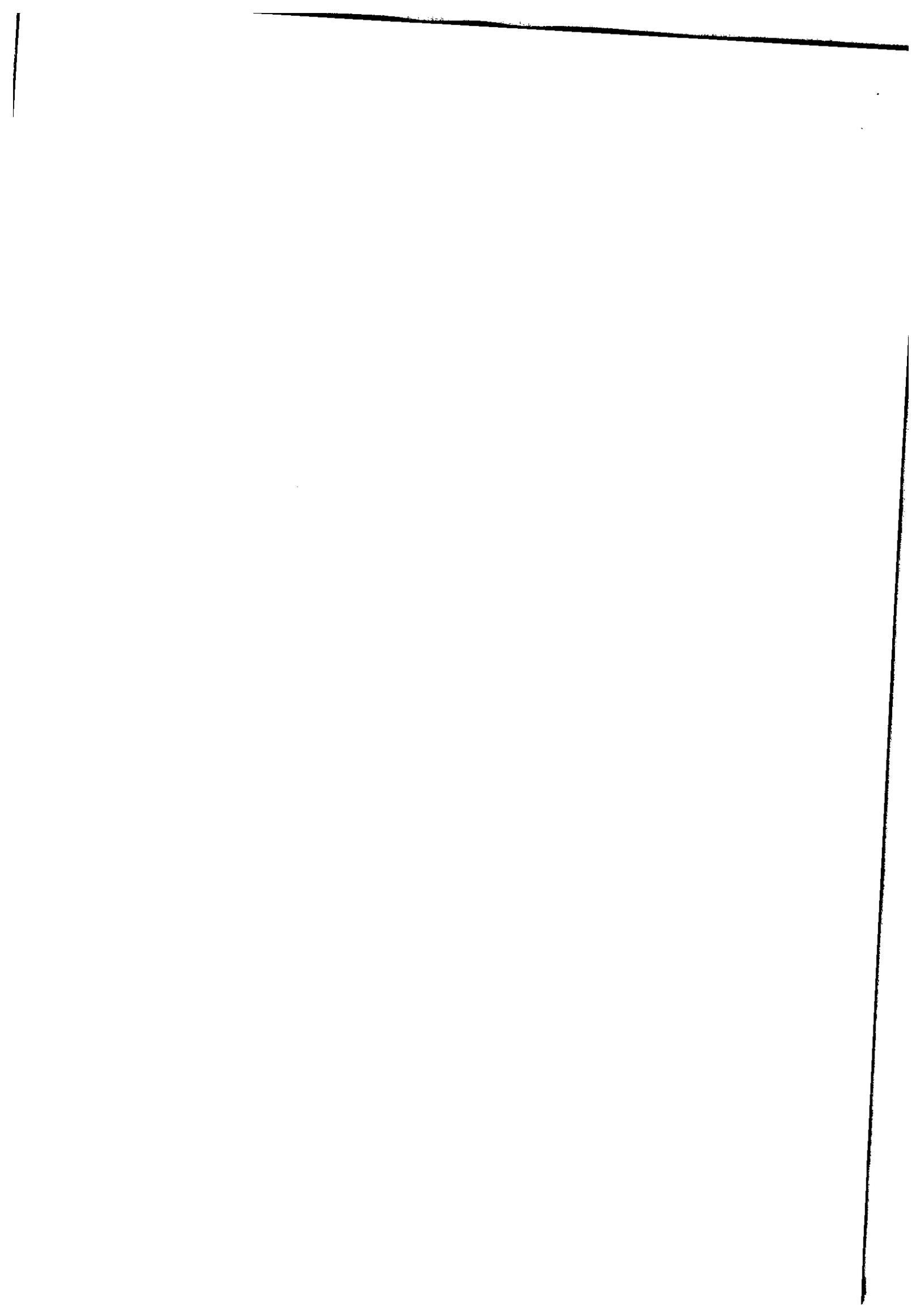
Outcomes:
The students will be outfitted with hands on knowledge in IOT using ARDUINO.
Upon completion of the program, the students will be able to

C01	Understand features of the Arduino platform
C02	Application development-Integrate with Zigbee
C03	Study and execute real time applications
C04	Application development -Li-Fi with Ardino
C05	Execute coding to gather and process data on the Arduino via the cloud.

PRINCIPAL
Mohamed Sathak A.J. College of Engineering
No.34, Rajiv Gandhi Salai (OMR)
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Chenai - 603103.

Total Hours: 45

GLAUCOMA DETECTION IN FUNDUS IMAGES USING CONVOLUTION NEURAL NETWORK BASED SEGMENTATION METHOD

A PROJECT REPORT

Submitted by

HASHIM ASLAM.T(311819106008)

MOHAMED SALAHUDEEN.R(311819106011)

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING
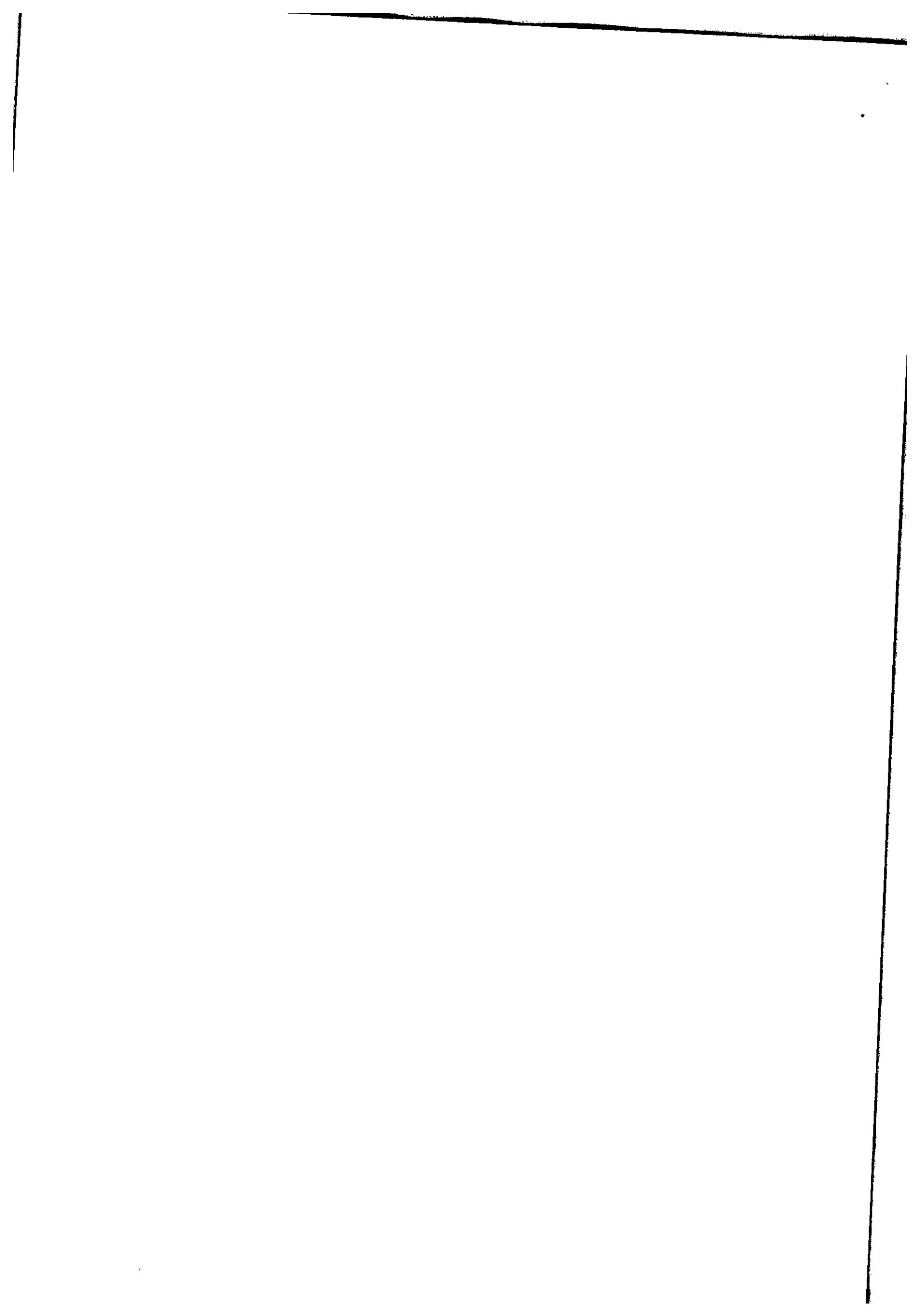
IN

ELECTRONICS AND COMMUNICATION ENGINEERING

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

ANNA UNIVERSITY : CHENNAI 600025

MAY 2023

ANNA UNIVERSITY : CHENNAI 600025

BONAFIED CERTIFICATE

Certified that this project report " **GLAUCOMA DETECTION IN FUNDUS IMAGES USING CONVOLUTIONAL NEURAL NETWORK BASED SEGMENTATION METHOD** " is the bonafide work of "**HASHIM ASLAM.T(311819106008), MOHAMED SALAHUDEEN.R(311819106011)**" who carried out the project work under my supervision.

SIGNATURE

Dr. I. MANJU

HEAD OF THE DEPARTMENT
PROFESSOR
Electronics and Communication
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Mrs. ANUSUYA.S

SUPERVISOR
ASSISTANT PROFESSOR
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Project Viva –Voce held on 18/5/2023

INTERNAL EXAMINER

EXTERNAL EXAMINER

PRINCIPAL
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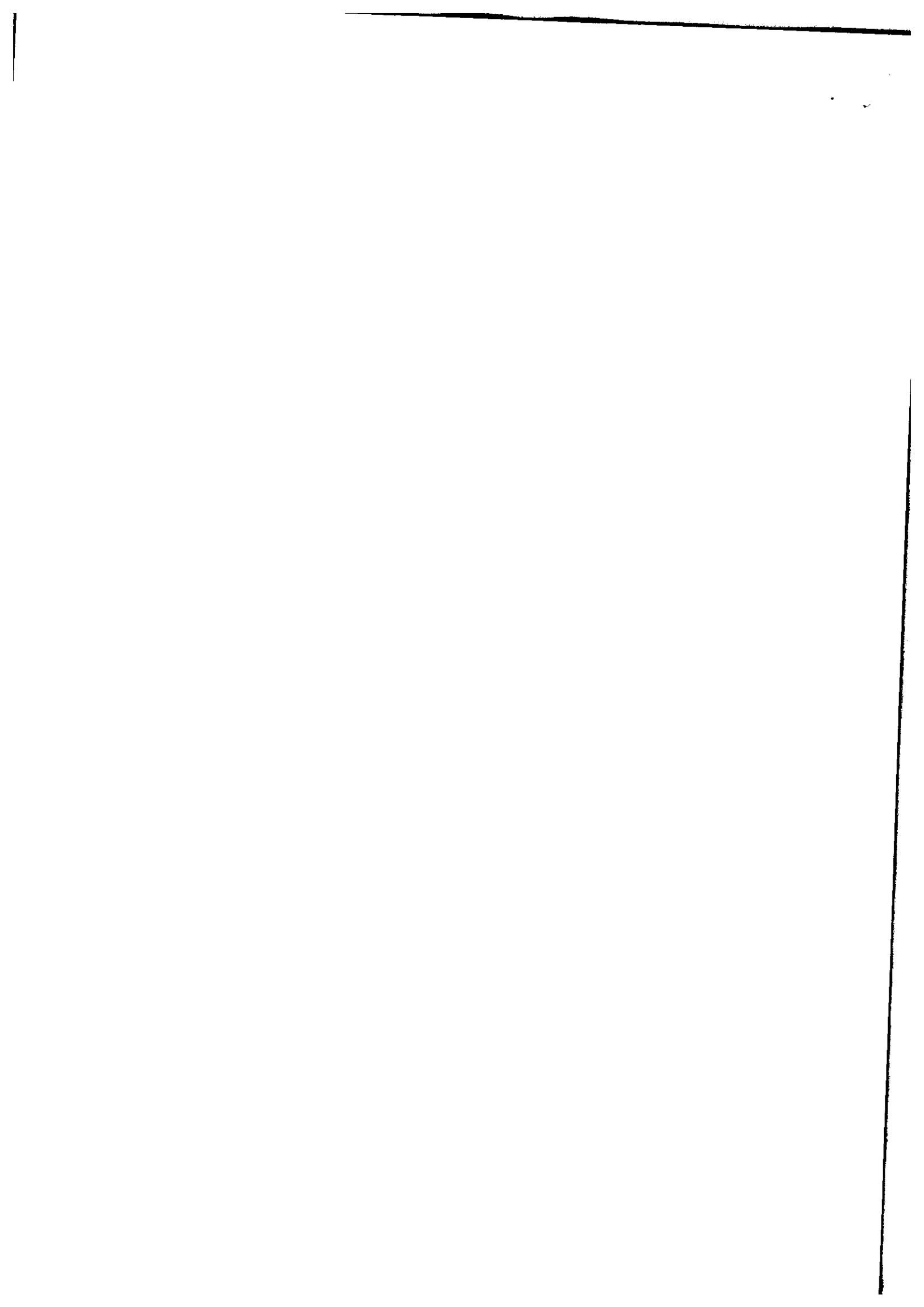
ABSTRACT

Glaucoma is a major global cause of blindness. As the symptoms of glaucoma appear, when the disease reaches an advanced stage, proper screening of glaucoma in the early stages is challenging. Therefore, regular glaucoma screening is essential and recommended. However, eye screening is currently subjective, time-consuming and labor-intensive and there are insufficient eye specialists available. We present an automatic two-stage glaucoma screening system to reduce the workload of ophthalmologists. The system first segmented the optic disc region using a Unet architecture. For the classification stage, we used pretrained deep convolutional neural networks and our proposed customized CNN model. The ensemble modeling is also tested by considering the both the pre-trained model and customized CNN model. For glaucoma classification, an ensemble of methods performed better than the conventional methods for DRISHTI-GS1 dataset with the accuracy of 96%. In addition we calculated the CDR value from segmented Cup and Disc region. This CDR can be used addition reference for physician to diagnose glaucoma at the early stage.

KEYWORDS: Glaucoma Detection, Fundus Images, Deep Learning, Convolutional Neural Network, Cup To Disc Ratio.

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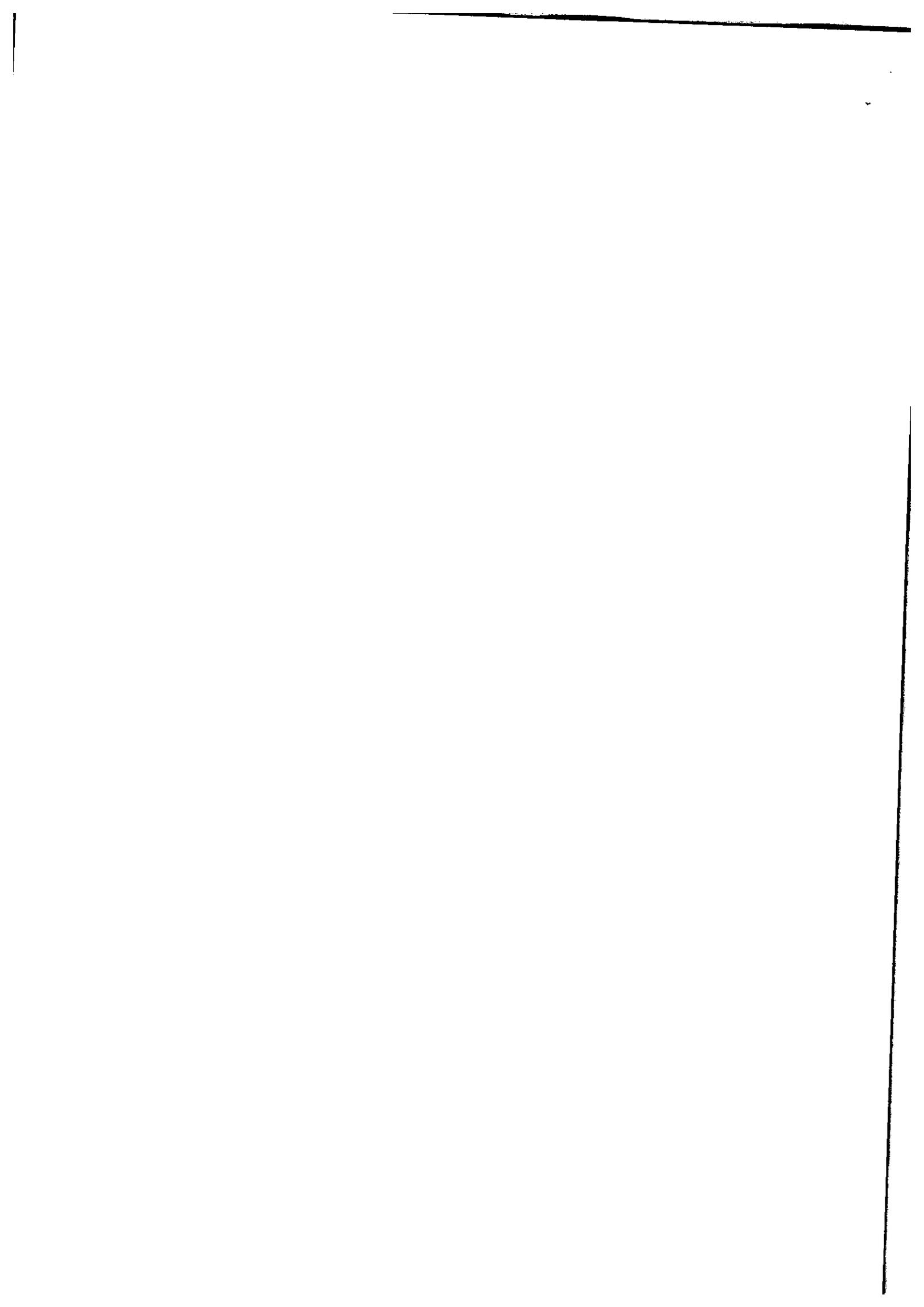
CHAPTER 5

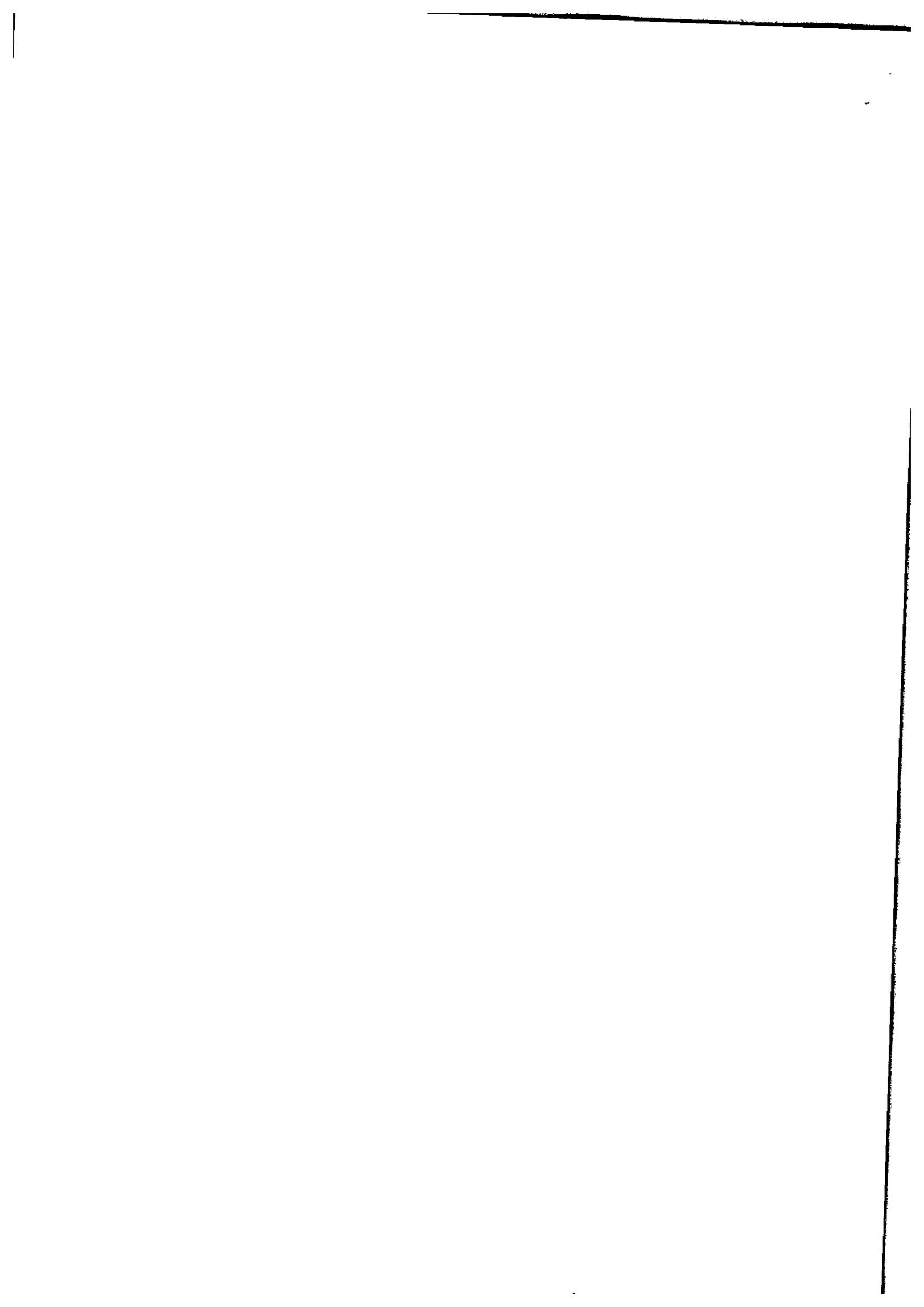## FUTURE ENHANCEMENT AND CONCLUSION

5.1 FUTURE ENHANCEMENT

In future its planned to develop a explainable model with visualization and perturbation explainbility, thus makes the deep CNN model clinically trustable.

5.2 CONCLUSION

we present a scheme that can effectively improve the segmentation and classification accuracy of OD and OC regions in Fundus images to effectively classify the glaucoma images. Our proposed architecture is based on Unet CNN segmentation model to segment OD and OC in fundus images. The experimental results demonstrate that our scheme achieves competitive results compared to state-of-the-art methods in Glaucoma image classification task. Since the deep learning algorithm requires a large amount of tagged data, more Glaucoma images and advanced network schemes for lesion classification are in great need to further improve the classification accuracy of indistinct lesion images and explore automatic detection methods for lesion localization. Though the model gave the higher classification accuracy, the Deep CNN suffers from model prediction expandability.

	L	T	P	C

EC8093 **DIGITAL IMAGE PROCESSING**   L T P C

                                                         3 0 0 3

OBJECTIVES:

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

UNIT I   DIGITAL IMAGE FUNDAMENTALS   **9**

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II   IMAGE ENHANCEMENT   **9**

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, Homomorphic filtering, Color image enhancement.

UNIT III   IMAGE RESTORATION   **9**

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV   IMAGE SEGMENTATION   **9**

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.
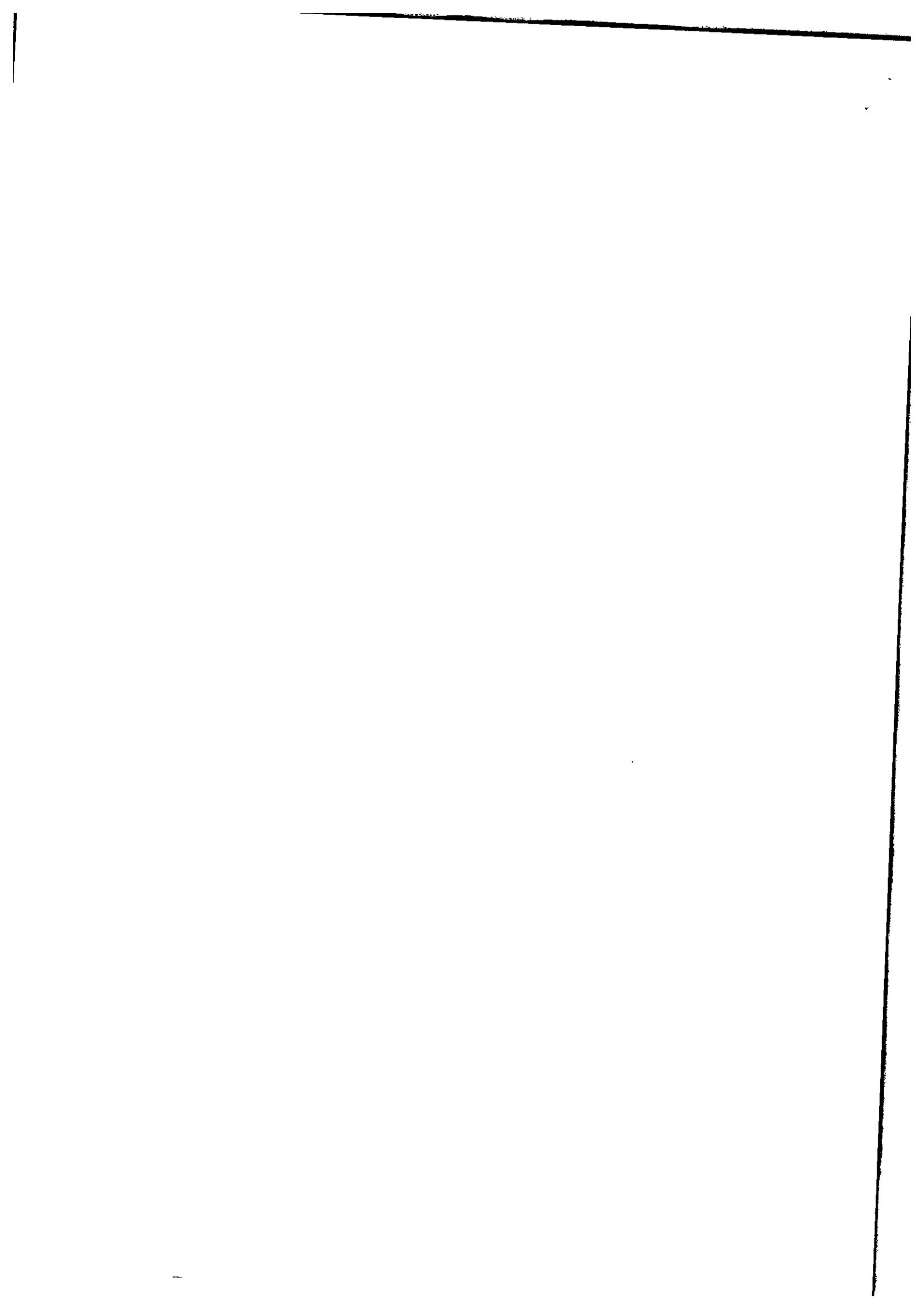
UNIT V   IMAGE COMPRESSION AND RECOGNITION   **9**

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS

OUTCOMES:

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

- Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
- Operate on images using the techniques of smoothing, sharpening and enhancement.
- Understand the restoration concepts and filtering techniques.
- Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Third Edition, 2010.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson, 2002.

REFERENCES

1. Kenneth R. Castleman, 'Digital Image Processing', Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2011.
3. D,E. Dudgeon and RM. Mersereau, 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, 'Digital Image Processing', John Wiley, New York, 2002
5. Milan Sonka et al 'Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.

GE8076	PROFESSIONAL ETHICS IN ENGINEERING	L T P C
		3 0 0 3

OBJECTIVE:

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I   HUMAN VALUES   10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II   ENGINEERING ETHICS   9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III   ENGINEERING AS SOCIAL EXPERIMENTATION   9
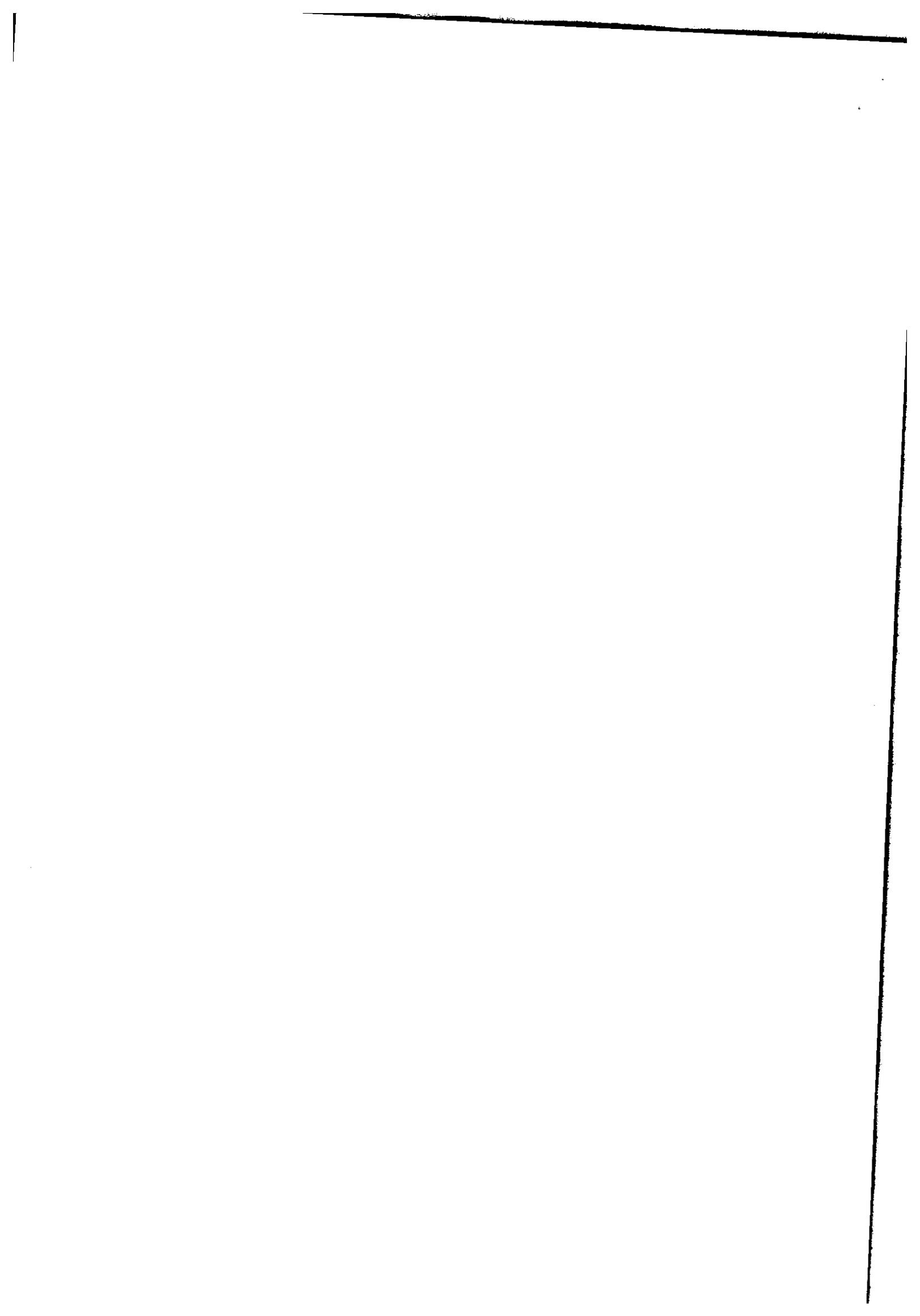
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV   SAFETY, RESPONSIBILITIES AND RIGHTS   9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk -

IOT BASED INSECTS FREE AND LIVE PARAMETER BIRD EGG INCUBATOR

A PROJECT REPORT

Submitted by

MOHAMMED ASIF.A(311819106012)

SAHAZATH SUFFIYAN.SA(311819106302)

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
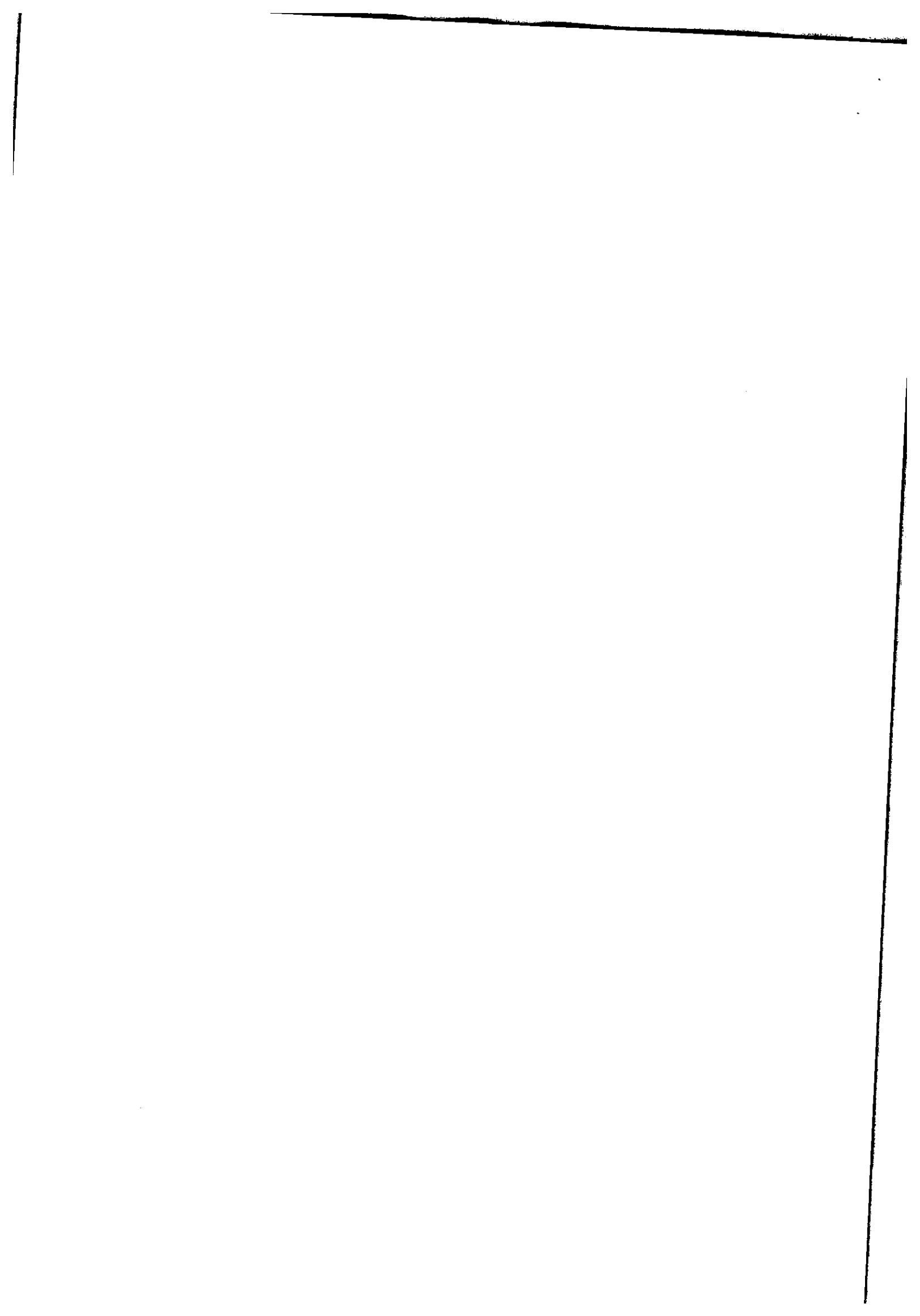
SIRUSERI,OMR,CHENNAI-603 103

ANNA UNIVERSITY : : CHENNAI 600 025

MAY 2023

PRINCIPAL
Mohamed Sathak A.J. College of Engineering
No.34, Rajiv Gandhi Salai (OMR)
Sipcot - IT Highway Egattur,
Chenai - 603103.

REFERENCES:
1. Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition 2014.
2. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd 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.

ME8792	POWER PLANT ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE:
- Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.

UNIT I   COAL BASED THERMAL POWER PLANTS   9
Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II   DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS   9
Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III   NUCLEAR POWER PLANTS   9
Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling *Water Reactor* (BWR), *Pressurized Water Reactor* (PWR), CANada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

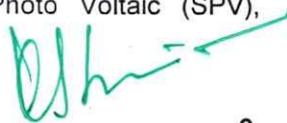**UNIT IV   POWER FROM RENEWABLE ENERGY   9**
Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V   ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS   9
Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

OUTCOMES:

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

CO1   Explain the layout, construction and working of the components inside a thermal power plant.

CO2   Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.

CO3   Explain the layout, construction and working of the components inside nuclear power plants.

CO4   Explain the layout, construction and working of the components inside Renewable energy power plants.

CO5   Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

TEXT BOOK:

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.

REFERENCES:

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010.
2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw – Hill, 1998.

EC8311	ELECTRONICS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To enability the students to understand the behavior of semiconductor device based on experimentation.

LIST OF EXPERIMENTS

1. Characteristics of Semiconductor diode and Zener diode
2. Characteristics of a NPN Transistor under common emitter , common collector and common base configurations
3. Characteristics of JFET and draw the equivalent circuit
4. Characteristics of UJT and generation of saw tooth waveforms
5. Design and Frequency response characteristics of a Common Emitter amplifier
6. Characteristics of photo diode & photo transistor, Study of light activated relay circuit
7. Design and testing of RC phase shift and LC oscillators
8. Single Phase half-wave and full wave rectifiers with inductive and capacitive filters
9. Differential amplifiers using FET
10. Study of CRO for frequency and phase measurements

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certificate that this project report **"IOT BASED INSECTS FREE AND LIVE PARAMETERING EGG INCUBATOR"** is the bona fide work of **MOHAMMED ASIF.A, SAHAZATH SUFFIYAN.SA** who carried out the project work under my supervision.

SIGNATURE

Dr.I.MANJU

Professor

HEAD OF THE DEPARTMENT

Electronics and communication Engineering

Mohamed Sathak A J College of Engineering

OMR road, Chennai-603 103

SIGNATURE

Dr.G.SIVARANJANI,

Assistant Professor

SUPERVISIOR

Electronics and communication Engineering

Mohamed Sathak A J College of Engineering

OMR road, Chennai-603 103

Project Viva-voice held on 18.05.23

INTERNAL EXAMINAR

EXTERNAL EXAMINAR

PRINCIPAL
Mohamed Sathak College of Engineering
No.34, Rajiv Gandhi Salai (OMR)
Sipcot - IT Highway Egattur,
Chenai - 603103.
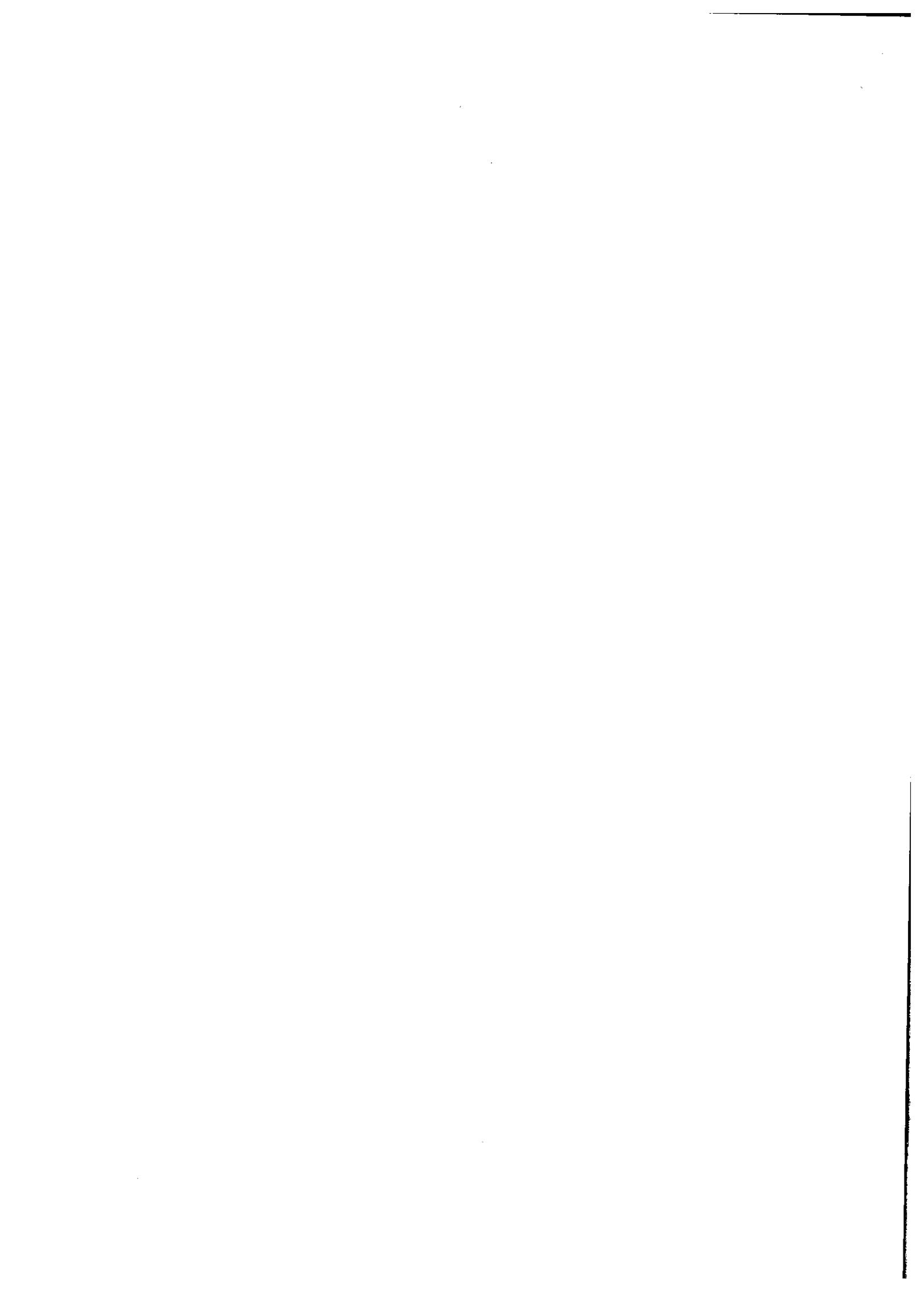
ABSTRACT

Egg incubator s playing vital major role in small scale poultry as well as large scale poultry specifically on hatching chicken eggs. Breeders carry out the process hatching chicken eggs using artificial incubator. Usually incubator is nothing it maintain temperature as well as humidity and the process carried out for 21 days. It that should maintain temperature 37.7c to 39.3c (+ or -0.5 c) and the humidity is from 50% to 65% temperature is measured using sensors inside the incubator. Designed incubator has a servo motor which helps in rotation of eggs every 8 hours per day 3 times to avoid sticking of the embryo to the eggshell internet of things (IOT) systems can help farmers to monitor from there smart phones when they are away from farm they will have recording option our module is specially programmed to save eggs from insects.

KEYWORDS: EMBEDDED C, INSECTS ALERT, LIVE MONITORING.

PRINCIPAL

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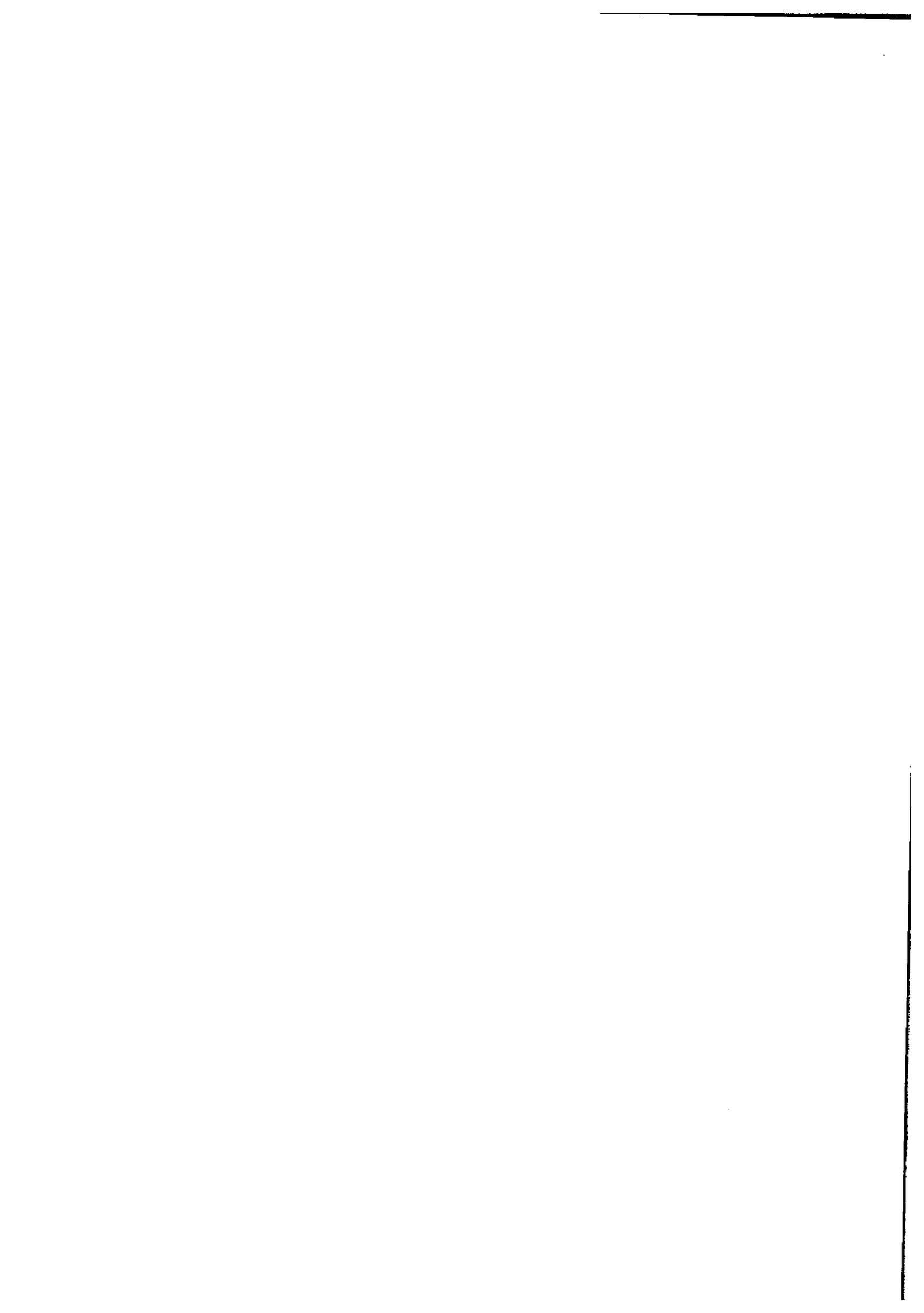
5.4 CONCLUSION

This incubation monitoring process via internet of things is successfully developed and implemented. In this work by using esp32cam feature the egg incubator can be monitored by using simple web page in any kind of smart phones or laptops all over the world. This designed incubator can be used for any kind of egg if we choose healthy eggs the best result was acheived and maintained a high hatching rate of 98.5% for totally 30eggs in average of 21days balance 1.45% not hatch yet. This is due to the accuracy of the temperature levels, air intake, humidity and horizontal eggs rotation.

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OUTCOMES:
Upon completion of the course, students will be able to:
- Implement linear and non-linear data structure operations using C
- Suggest appropriate linear / non-linear data structure for any given data set.
- Apply hashing concepts for a given problem
- Modify or suggest new data structure for an application
- Appropriately choose the sorting algorithm for an application

TEXTBOOKS:
1. Pradip Dey and Manas Ghosh, —Programming in C, Second Edition, Oxford University Press, 2011.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008.

REFERENCES:
1. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 1996
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, —Data Structures and Algorithms, Pearson Education, 1983.
3. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla , — Data Structures and Program Design in C, Second Edition, Pearson Education, 2007
4. Jean-Paul Tremblay and Paul G. Sorenson, —An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, 1991.

EC8351	ELECTRONIC CIRCUITS I	L	T	P	C
		3	0	0	3

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 π equivalent circuit of BJT – Early effect - Analysis of CE, CC and CB amplifiers using Hybrid π 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   9
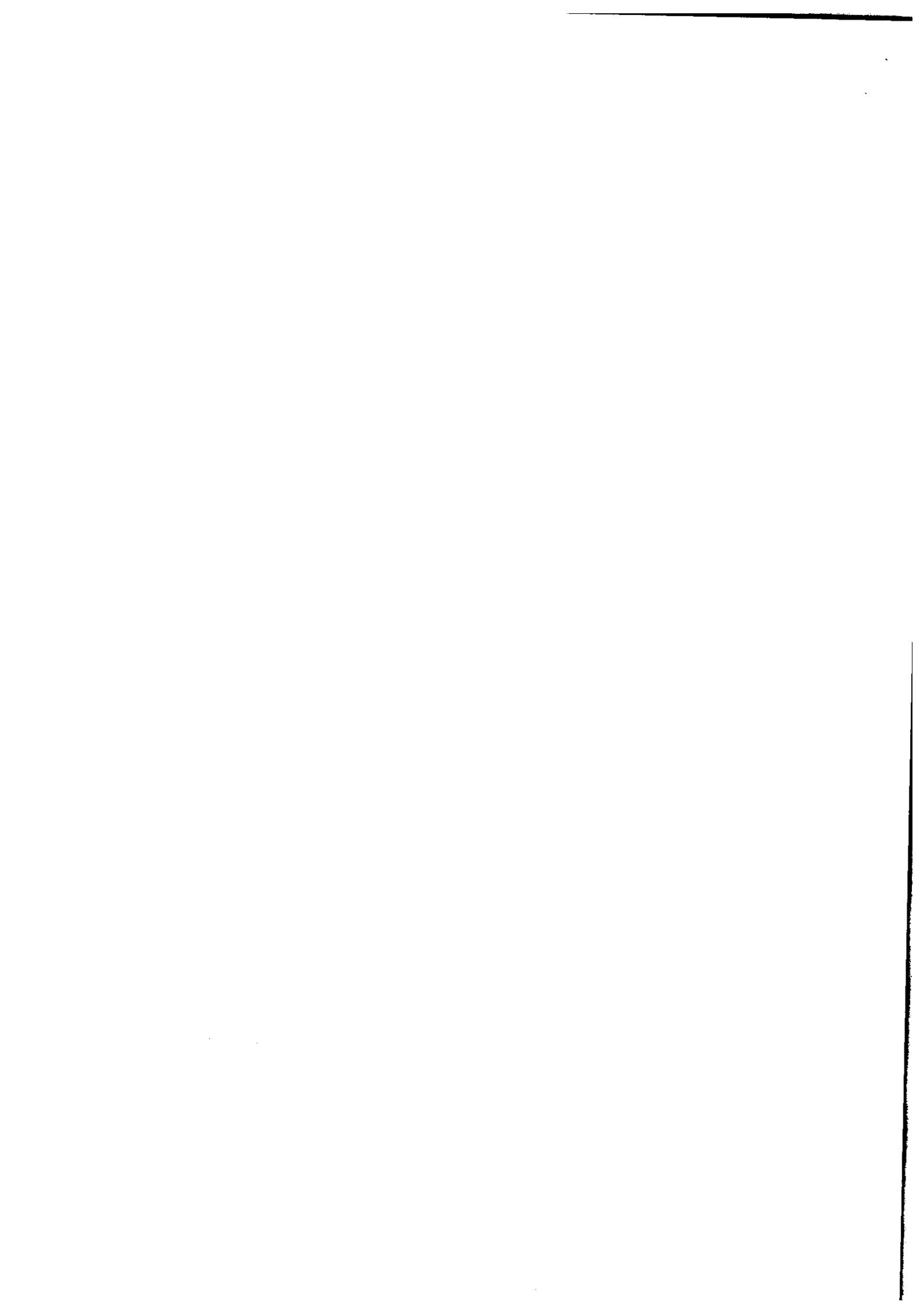
Small Signal Hybrid π equivalent circuit of FET and MOSFET - Analysis of CS, CD and CG amplifiers using Hybrid π equivalent circuits - Basic FET differential pair- BiCMOS circuits.

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.

<div align="right">

TOTAL: 45   PERIODS

</div>

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 multi stage amplifiers
- Apply the knowledge gained in the design of Electronic circuits

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

REFERENCES
1. Millman J, Halkias.C.and Sathyabrada Jit, Electronic Devices and Circuits, 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.
2. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, 4th 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, 5th Edition, Oxford University Press, 2008.
5. Anwar A. Khan and Kanchan K. Dey, A First Course on Electronics, PHI, 2006.
6. Rashid M, Microelectronics Circuits, Thomson Learning, 2007.

EC8352	SIGNALS AND SYSTEMS	L	T	P	C
		4	0	0	4

PRINCIPAL
Mohamed Sathak A.J. College of Engineering
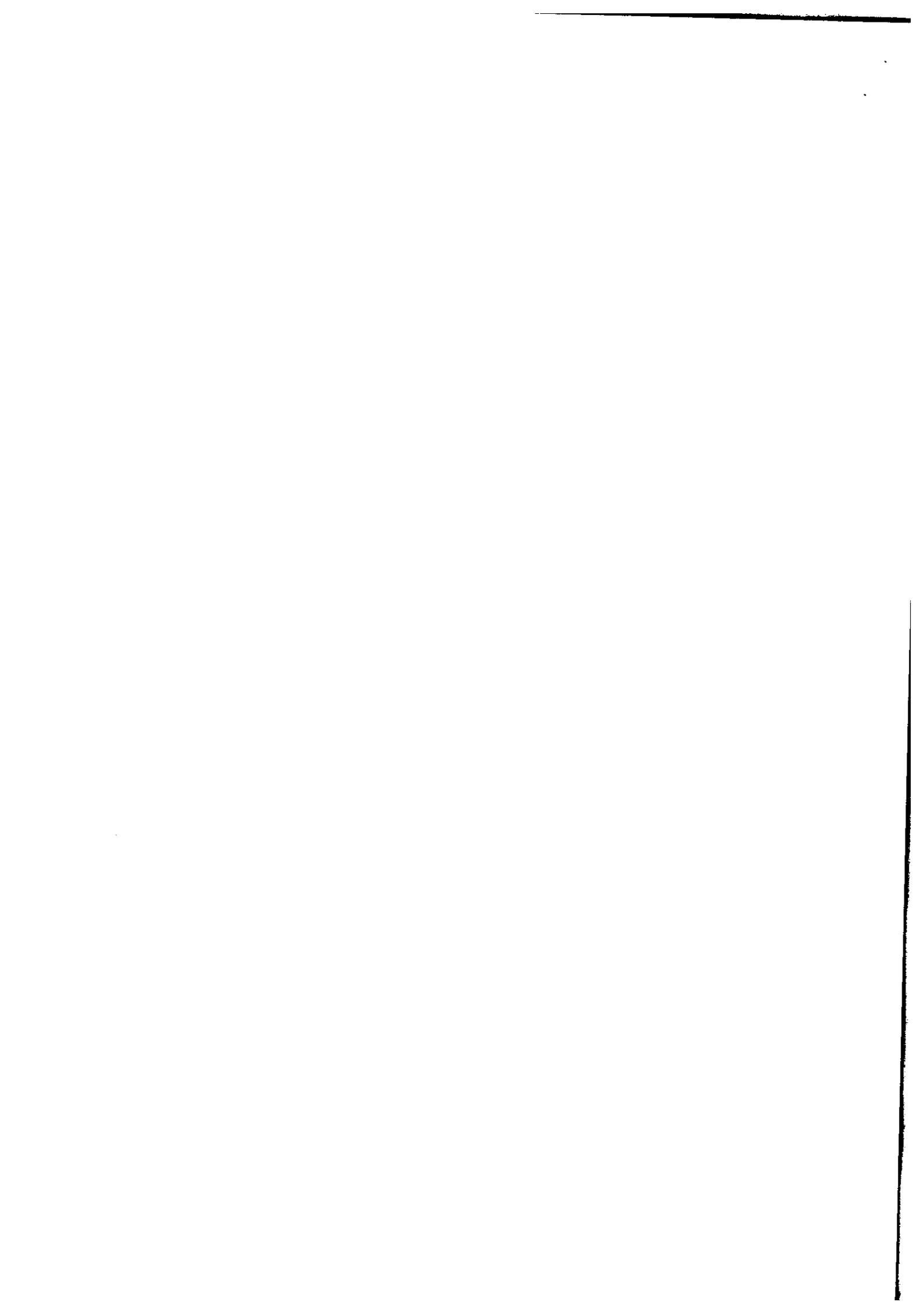No.24, Rajiv Gandhi Salai (OMR)
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Chennai

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

UNIT I   CLASSIFICATION OF SIGNALS AND SYSTEMS   12
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

Semester -6	Value Added Course on	L	T	P	C
	IOT USING ARDUINO	1	0	2	2

Objectives:

- To expose student and gain knowledge about Arduino technology with IOT
- To Program and construct applications using Arduino using a number of different sensors and IOT

Unit – I Introduction to Arduino

Embedded processing portfolio, Architecture and hardware organization of Arduino, Configuring GPIO and Clock systems, Real time applications using GPIO configuration, LCD interfacing, Technical explanation ADC, Configuring ADC, Real time applications using Sensors

Unit – II Interfacing with Zigbee

Bluetooth Interfacing, Android mobile based device control ,GSM interfacing and send SMS, Real time Application Development with GSM ,Zigbee Interfacing, Data transmission using zigbee, Real time applications interfacing with sensors and Zigbee

Unit – III Real Time applications

DC Motor Interfacing, H-bridge concept and design and ultrasonic interfacing, Clockwise and anticlockwise control, Real time applications interfacing with robotic vehicle model, Real time applications interfacing with sensors and Robot

Unit – IV Li-Fi with Ardino

Introduction, Li-Fi based Data communication, Interfacing Li-Fi with Arduino, Application Development with Li-Fi.

Unit – V IOT –Configuration & Integration

Introduction to IoT & Scope of IoT, Web page creation, Data transmission from sensors, Configuration webpage ,Sensor data monitoring , Wireless Interfacing, Android mobile based device control, GSM interfacing and send SMS, Real time Application Development with GSM, Zigbee Interfacing Data transmission using zigbee, Real time applications interfacing with robotic vehicle.
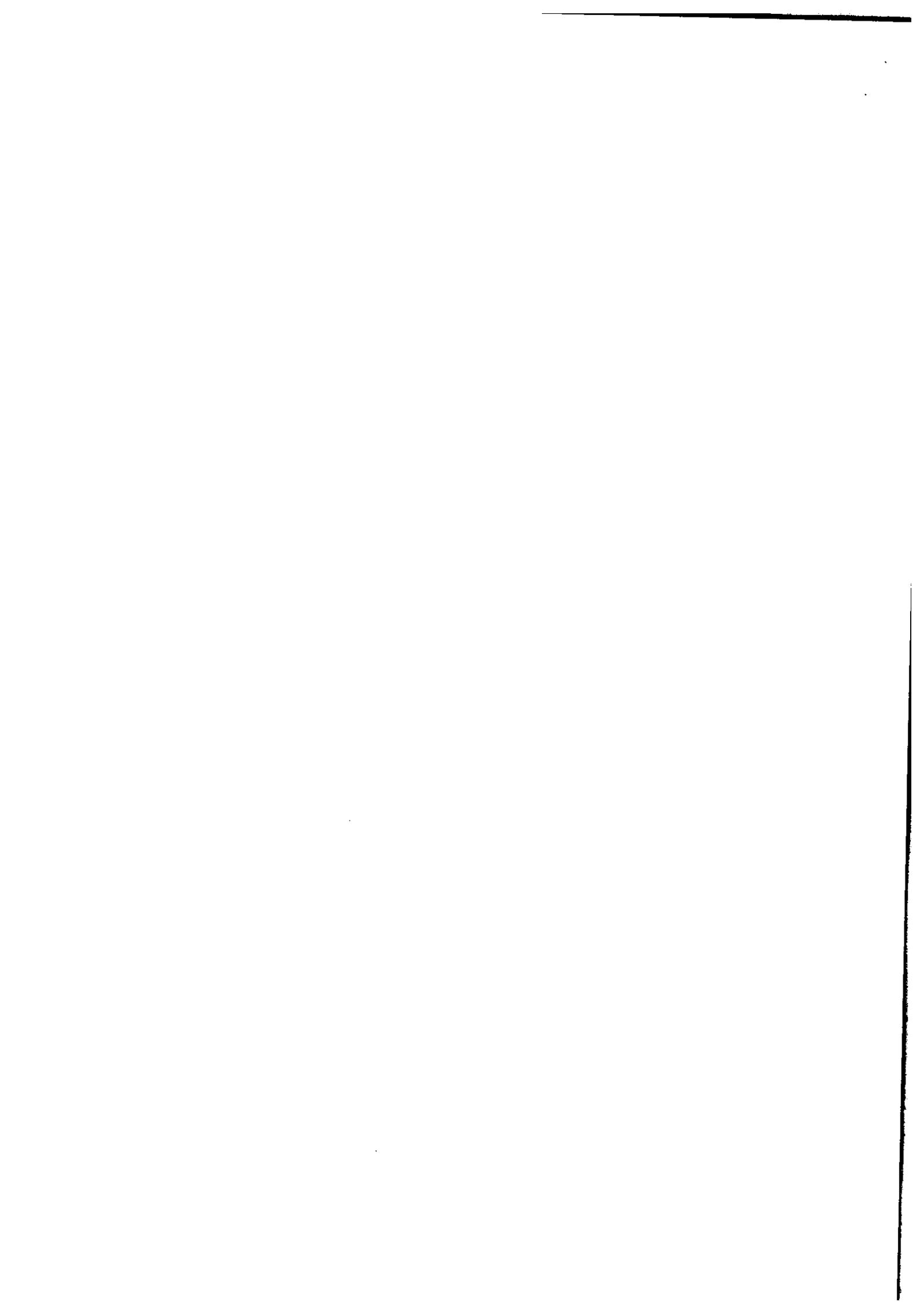
Outcomes:

The students will be outfitted with hands on knowledge in IOT using ARDUINO.

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

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C02	Application development-Integrate with Zigbee
C03	Study and execute real time applications
C04	Application development -Li-Fi with Ardino
C05	Execute coding to gather and process data on the Arduino via the cloud.

Total Hours: 45

VEHICLE INFORMATION STORAGE CONTAINER WITH RECOVERY USING ESP32 CAM

A PROJECT REPORT

Submitted by

AHAMED ALI. H	(31819106001)
MOHAMED ABDULLAH. M	(31819106010)
RIZWAN AHAMED. M	(31819106018)

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING
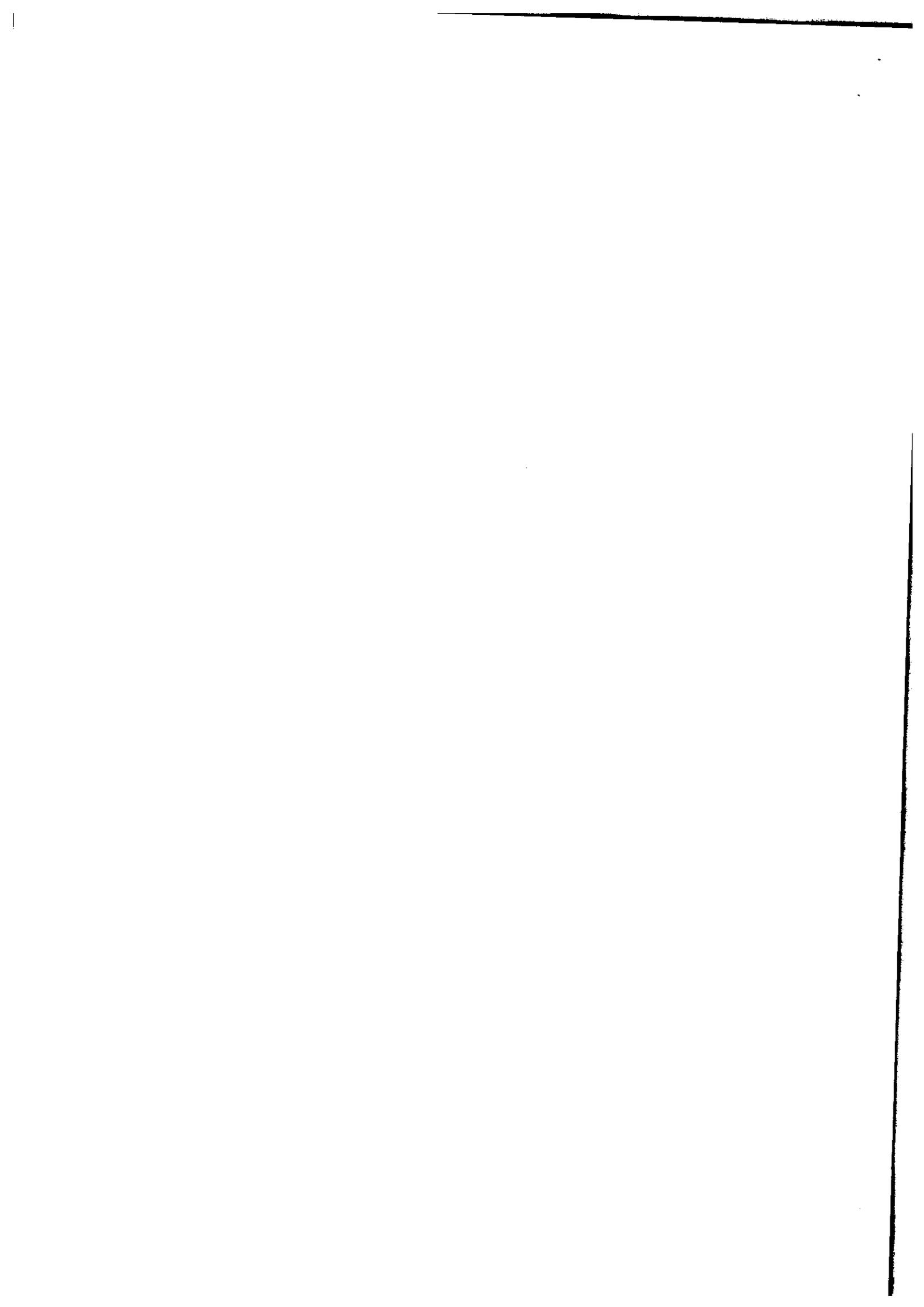
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ANNA UNIVERSITY : : CHENNAI 600 025

MAY 2023

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Certified that this project report " **VEHICLE INFORMATION STORAGE CONTAINER WITH VIDEO RECOVERING USING ESP32** " is the bona fide work of " **AHAMED ALI.H(311819106001), MOHAMED ABDULLAH.M(311819106010),RIZWAN AHAMED.M(311819106018)**"who carried out the project work under my supervision.

SIGNATURE

SIGNATURE

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HEAD OF THE DEPARTMENT,

DR.M.SIVAKUMAR,

ASSOCIATE PROFESSOR,

Electronics and communication

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Electronics and communication

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Project Viva-Voce held on ......18...05.2023........

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INTERNAL EXAMINAR

EXTERNAL EXAMINAR
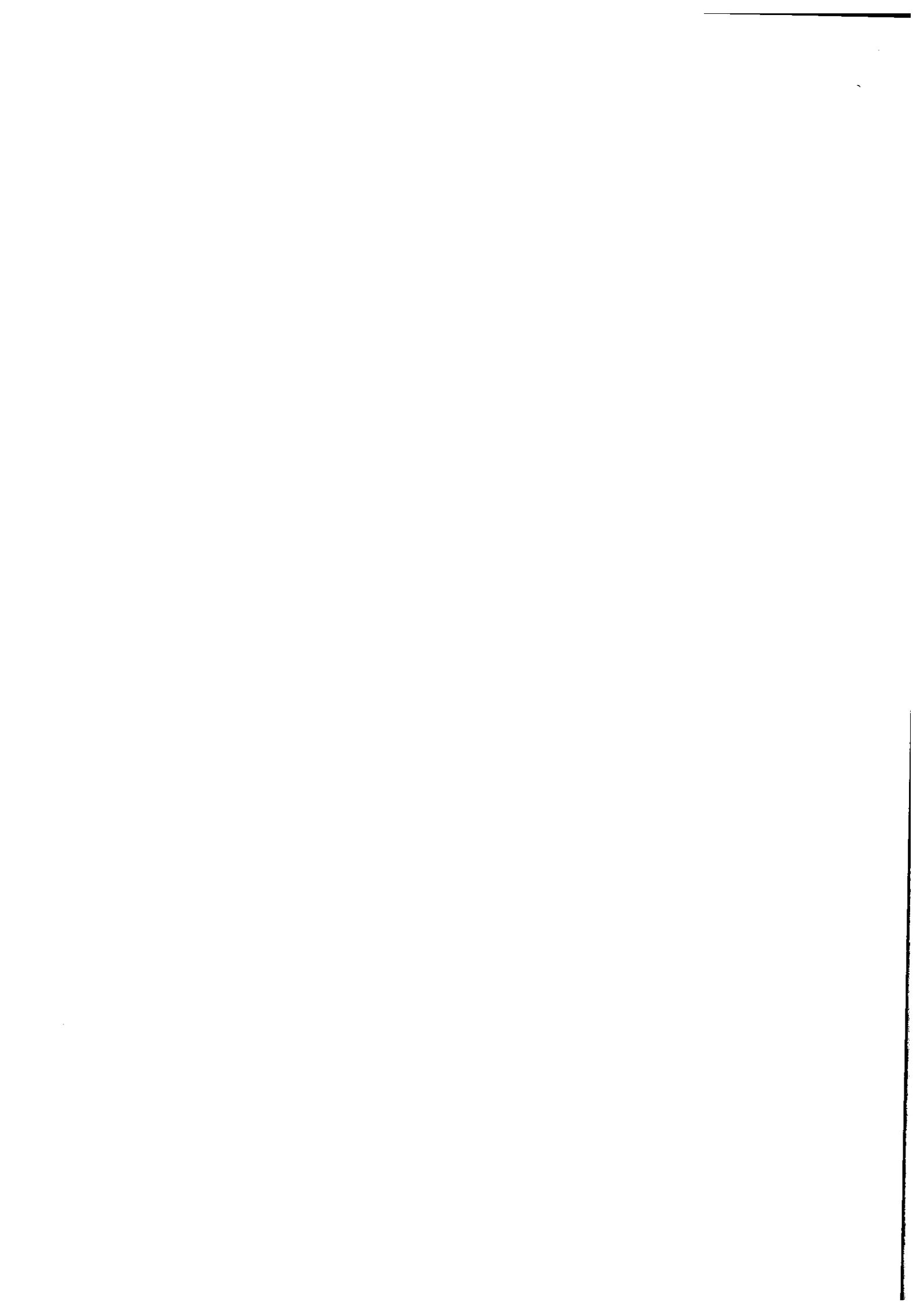
ABSTRACT

This paper discusses provided is a method of storing accident data for a vehicle, in which image data taken by a camera during driving is stored in real time. Recently, to acquire data for determining circumstances at the time of a vehicle accident and a fault between parties, research and development on a vehicle black box for recording driving data such as vehicle speed have been conducted actively. In particular, a vehicle accident data recording apparatus has recently attracted much attention, which records external circumstances at the time of an accident as image data by using a camera mounted in the vehicle and uses pre- and post-accident external image data as well as driving data, thereby finding out cause of the accident. The accident of the vehicle means an unexpected event which may cause damage to a body of the vehicle or of a passenger. In this proposed method, ARDUINO UNO microcontroller is used to interface with the sensors and to the communication devices. The crash sensor, Temperature sensor and gas sensor are used to get the major three road accident information. The SD card module and IOT module is used to store the information locally and globally. The I2C LCD module is used connect the LCD using ONEWIRE protocol. The LCD is used to update the latest sensor and communication information in the LCD. The GPS device is used to get the information of the location of the vehicle. The GSM is used to send the accident information to the police or respective person care takers.

KEY WORDS: INFORMATION CONTAINER, IOT, GPS, ESP-32 CAM.

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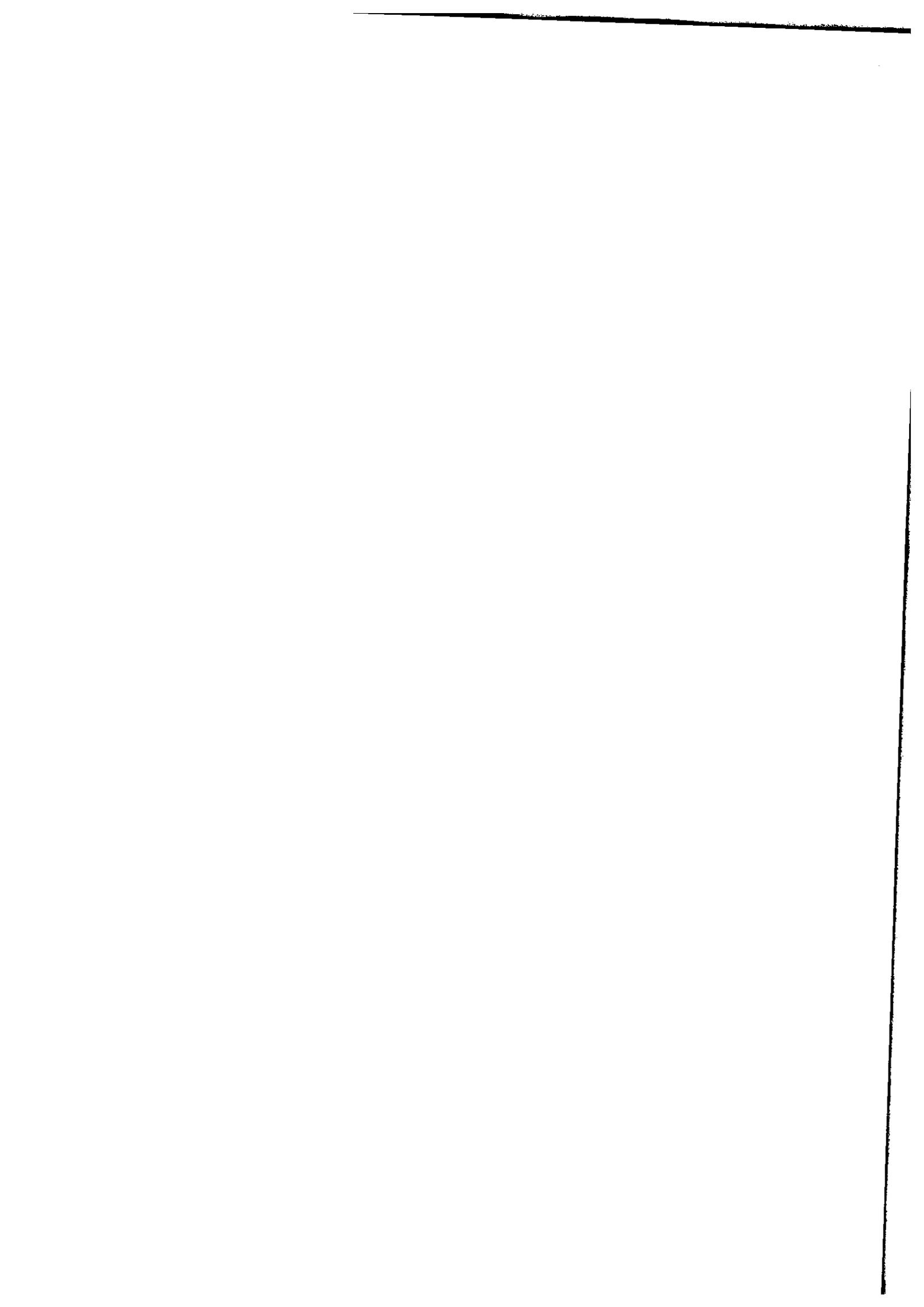
CHAPTER: 6

FUTURE ENHANCEMENT

6.1 APPLICATIONS

❖ This system is used in vehicle for monitoring purpose and get the respective information.

6.2 FUTURE ENHANCEMENT:

❖ In future we can use the camera and image processing techniques to get the more information about the accidents.

❖ Use of AI automatically found the reason for the accidents.

6.3 ADVANTAGES:
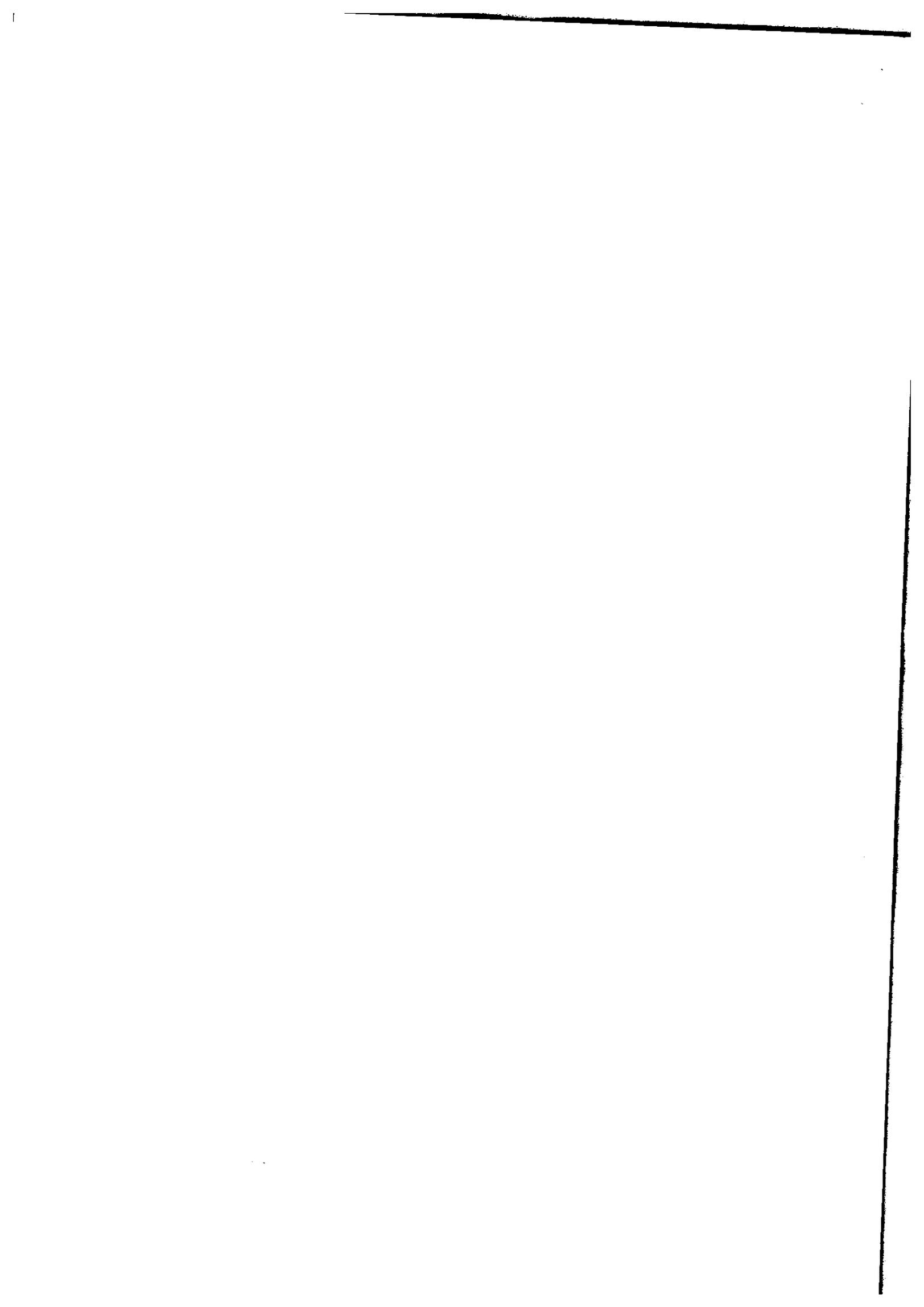
❖ The accident information is recorded and the data is updated to the cloud.

❖ Monitoring of vehicle is easier.

❖ Investigation report got more accurate and less time.

6.4 CONCLUSION:

In this paper, we proposed an intelligent black box based safety information gathering system. We added additional functionalities to the ordinary car black box such as license plate number and color recognition of neighboring vehicles and IOT functionality to receive the information request message and upload the stored information. We also show the simulation and implementation details of the proposed system.

OUTCOMES:
At the end of the course, the student should be able to:
- Realize basic elements in optical fibers, different modes and configurations.
- Analyze the transmission characteristics associated with dispersion and polarization techniques.
- Design optical sources and detectors with their use in optical communication system.
- Construct fiber optic receiver systems, measurements and coupling techniques.
- Design optical communication systems and its networks.

TEXT BOOKS:
1. P Chakrabarti, "Optical Fiber Communication", McGraw Hill Education (India)Private Limited, 2016 (UNIT I, II, III)
2. Gred Keiser,"Optical Fiber Communication", McGraw Hill Education (India) Private Limited. Fifth Edition, Reprint 2013. (UNIT I, IV, V)

REFERENCES:
1. John M.Senior, "Optical fiber communication", Pearson Education, second edition.2007.
2. Rajiv Ramaswami, "Optical Networks ", Second Edition, Elsevier , 2004.
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.
4. Govind P. Agrawal, "Fiber-optic communication systems", third edition, John Wiley & sons, 2004.

EC8791	EMBEDDED AND REAL TIME SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:
The student should be made to:
- Understand the concepts of embedded system design and analysis
- Learn the architecture and programming of ARM processor
- Be exposed to the basic concepts of embedded programming
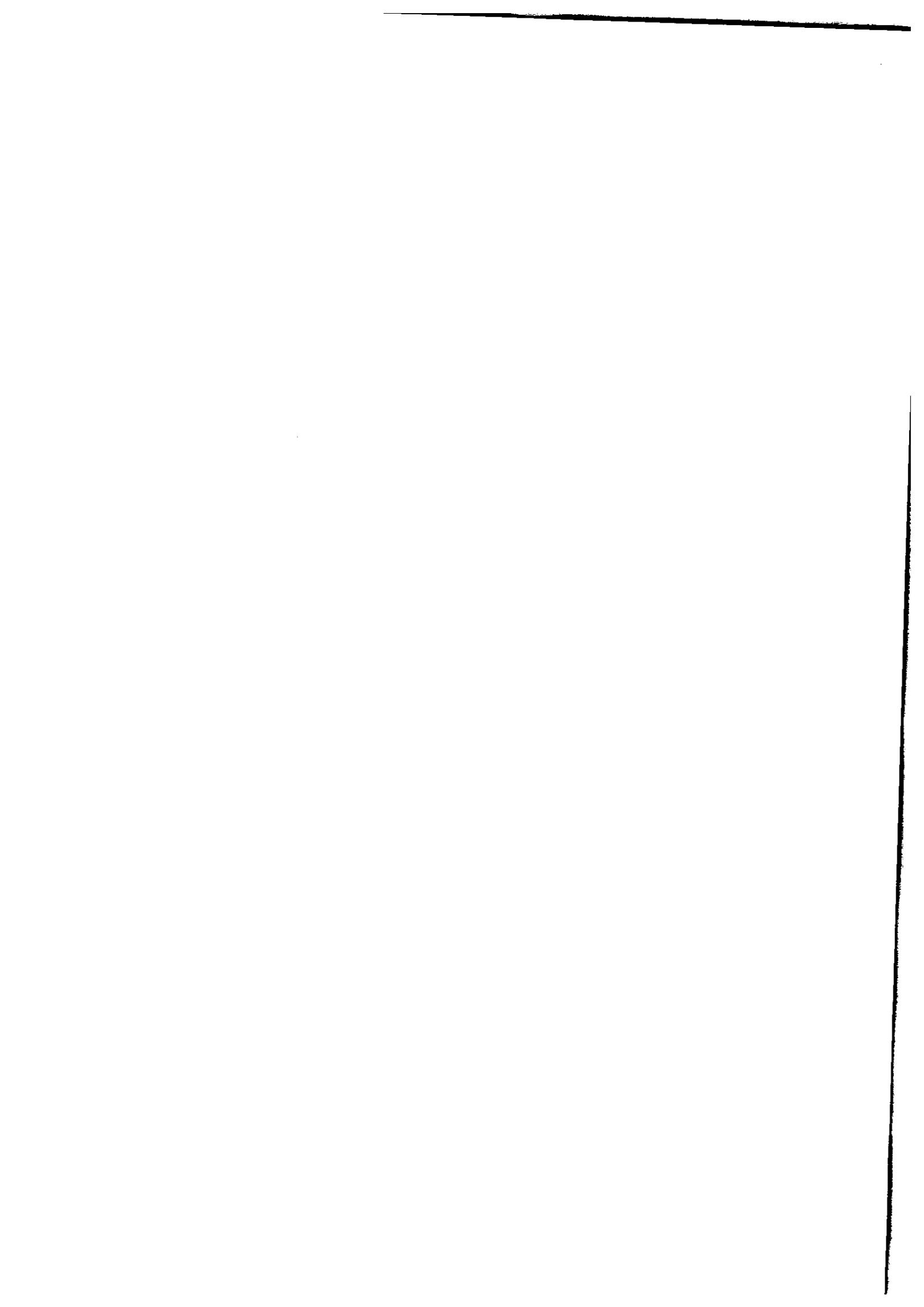- Learn the real time operating systems

UNIT I   INTRODUCTION TO EMBEDDEDSYSTEM DESIGN   9
Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT II   ARM PROCESSOR AND PERIPHERALS   9

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT III   EMBEDDED PROGRAMMING

9

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 IV   REAL TIME SYSTEMS

9

Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronisation.

UNIT V   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. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

TOTAL: 45   PERIODS

OUTCOMES:
At the end of the course, the student should 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
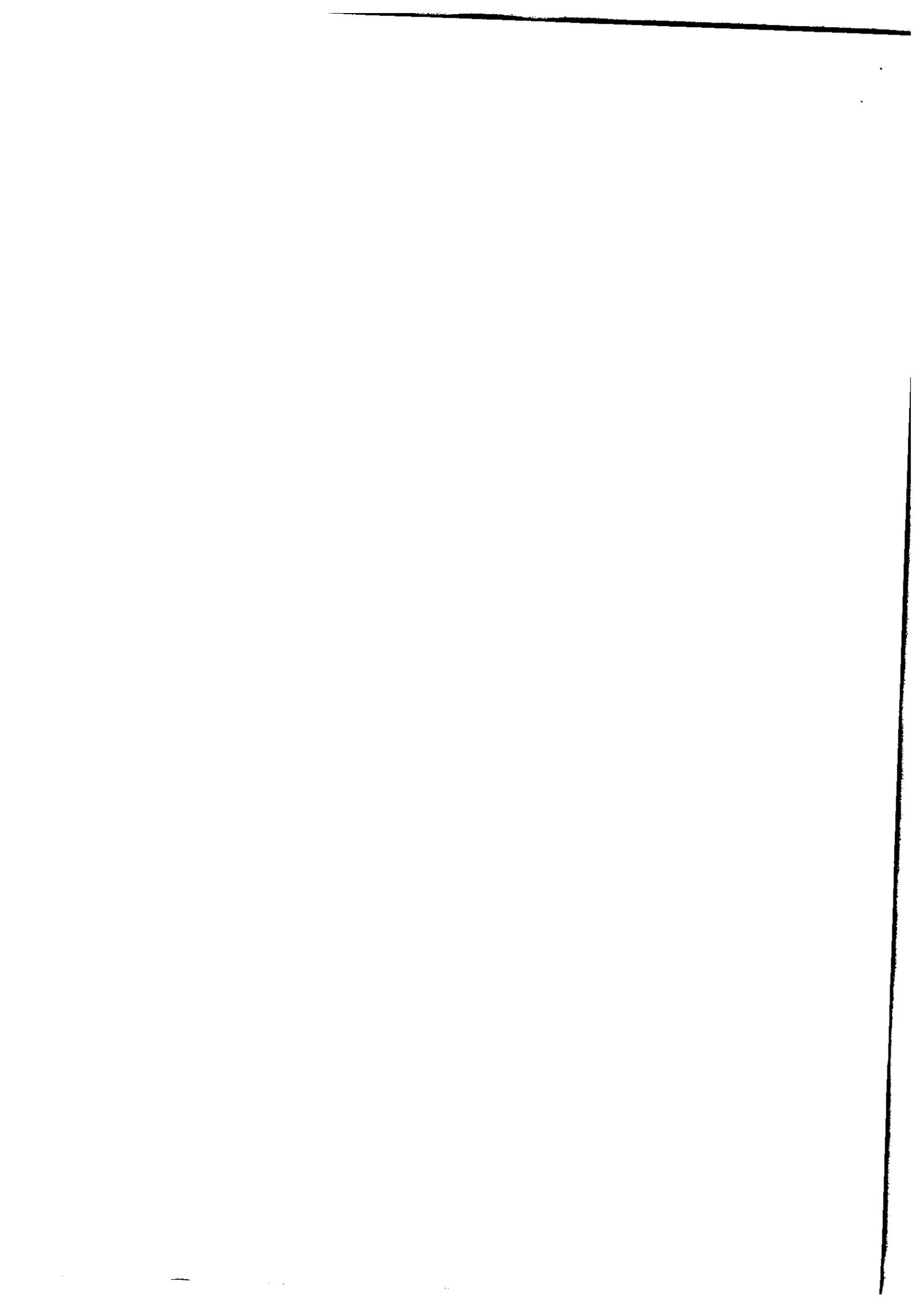- Model real-time applications using embedded-system concepts

TEXT BOOKS:
1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)
2. Jane W.S.Liu," Real Time Systems", Pearson Education, Third Indian Reprint, 2003.(UNIT IV)

REFERENCES:
1. Lyla B.Das, "Embedded Systems : An Integrated Approach" Pearson Education, 2013.
2. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.
3. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
4. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
5. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997
6. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
7. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.

		L	T	P	C

Semester -6   **Value Added Course on**
IOT USING ARDUINO   L T P C   1 0 2 2

Objectives:

- To expose student and gain knowledge about Arduino technology with IOT
- To Program and construct applications using Arduino using a number of different sensors and IOT

Unit – I Introduction to Arduino

Embedded processing portfolio, Architecture and hardware organization of Arduino, Configuring GPIO and Clock systems, Real time applications using GPIO configuration, LCD interfacing, Technical explanation ADC, Configuring ADC, Real time applications using Sensors

Unit – II Interfacing with Zigbee

Bluetooth Interfacing, Android mobile based device control ,GSM interfacing and send SMS, Real time Application Development with GSM ,Zigbee Interfacing, Data transmission using zigbee, Real time applications interfacing with sensors and Zigbee

Unit – III Real Time applications

DC Motor Interfacing, H-bridge concept and design and ultrasonic interfacing, Clockwise and anticlockwise control, Real time applications interfacing with robotic vehicle model, Real time applications interfacing with sensors and Robot

Unit – IV Li-Fi with Ardino

Introduction, Li-Fi based Data communication, Interfacing Li-Fi with Arduino, Application Development with Li-Fi.

Unit – V IOT –Configuration & Integration

Introduction to IoT & Scope of IoT, Web page creation, Data transmission from sensors, Configuration webpage ,Sensor data monitoring , Wireless Interfacing, Android mobile based device control, GSM interfacing and send SMS, Real time Application Development with GSM, Zigbee Interfacing Data transmission using zigbee, Real time applications interfacing with robotic vehicle.

Outcomes:

The students will be outfitted with hands on knowledge in IOT using ARDUINO. .

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

C01	Understand features of the Arduino platform
C02	Application development-Integrate with Zigbee
C03	Study and execute real time applications
C04	Application development -Li-Fi with Ardino
C05	Execute coding to gather and process data on the Arduino via the cloud

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Total Hours: 45
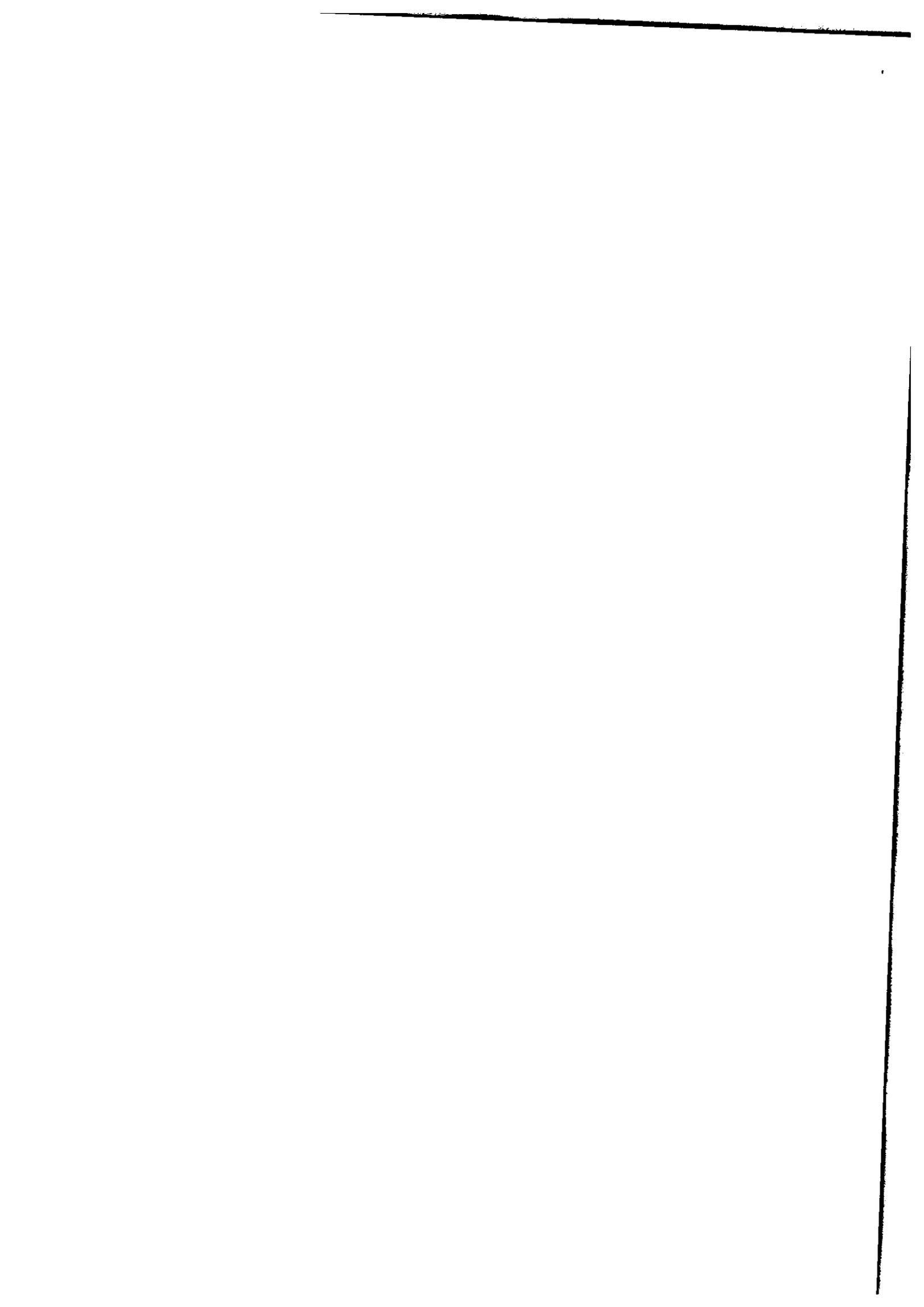
DEPARTMENT OF ECE

1.3.2 Courses that include experiential learning through project work/field work/internship during 2022-2023

S.No	Register No	Name of Student	Year of Study	Company Name	Subject code & Subjects name related to the Internship
1	311820106011	S.Kishore	2022	NOOBTRON PVT LTD	EC8551-Communication networks EC8652-Wireless communication
2	311819106015	Pattapu Prathyusha	2022	NOOBTRON PVT LTD	EC8551-Communication networks EC8652-Wireless communication
3	311820106009	K.Abinaya	2022	NOOBTRON PVT LTD	EC8551-Communication networks EC8652-Wireless communication
4	311820106001	Janani.M.E	2022	PANTECH E-LEARNING	GE8151-Problem solving and Python programming

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SCIENTIFIC STAY CERTIFICATE

Aug 27th, 2022

TO WHOM IT MAY CONCERN

Re: Mr. KISHORE S

This is to certify that, **Mr. KISHORE S** of Third year, B. E. Electronics and Communication Engineering from Mohamed Sathak AJ College of Engineering, has completed his internship of One month from July 24th, 2022 to August 24th, 2022.

During this intern, he got exposure of various Research (R&D) project entitled on **"COMMUNICATION NETWORK RAPID FAULT DETECTION RESTORATION SYSTEM FOR A RELIABLE UNDERGROUND DISTRIBUTION OFC USING MODERN TECHNOLOGY".** He has successfully completed all the tasks and assignments given to him. His performance has been found up to the mark during internship period.

We wish best of luck for his Future Endeavours.

Sincerely,

Mr. BALAJI RAMACHANDRAN

Chief Executive Officer

NoobTron Private Limited, India.

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Mohamed Sathak A.J. College of Engineering
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Aug 27th, 2022

TO WHOM IT MAY CONCERN

Re: Ms. PATTAPU PRATHYUSHA

This is to certify that, **Ms. PATTAPU PRATHYUSHA** of Third year, B. E. Electronics and Communication Engineering from Mohamed Sathak AJ College of Engineering, has completed her internship of One month from July 24th, 2022 to August 24th, 2022.

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Sincerely,

Mr. BALAJI RAMACHANDRAN

Chief Executive Officer

NoobTron Private Limited, India.

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Sipcot - IT Highway Egattur,
Chenai - 603103.

SCIENTIFIC STAY CERTIFICATE

Aug 27th, 2022

TO WHOM IT MAY CONCERN

Re: Ms. ABINAYA K

This is to certify that, **Ms. ABINAYA K** of Third year, B. E. Electronics and Communication Engineering from Mohamed Sathak AJ College of Engineering, has completed her internship of One month from July 24th, 2022 to August 24th, 2022.

During this intern, she got exposure of various Research (R&D) project entitled on **"COMMUNICATION NETWORK RAPID FAULT DETECTION RESTORATION SYSTEM FOR A RELIABLE UNDERGROUND DISTRIBUTION OFC USING MODERN TECHNOLOGY"**. She has successfully completed all the tasks and assignments given to her. Her performance has been found up to the mark during internship period.

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Sincerely,

Mr. BALAJI RAMACHANDRAN

Chief Executive Officer

NoobTron Private Limited, India.

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NAME   Janani.M.E

COLLEGE   Mohamed sathak A.J college of engineering

has Successfully Completed
1 Month Internship in Python Programming

at Pantech e Learning Pvt Ltd, Chennai

From   16.08.2022   To   15.09.2022

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