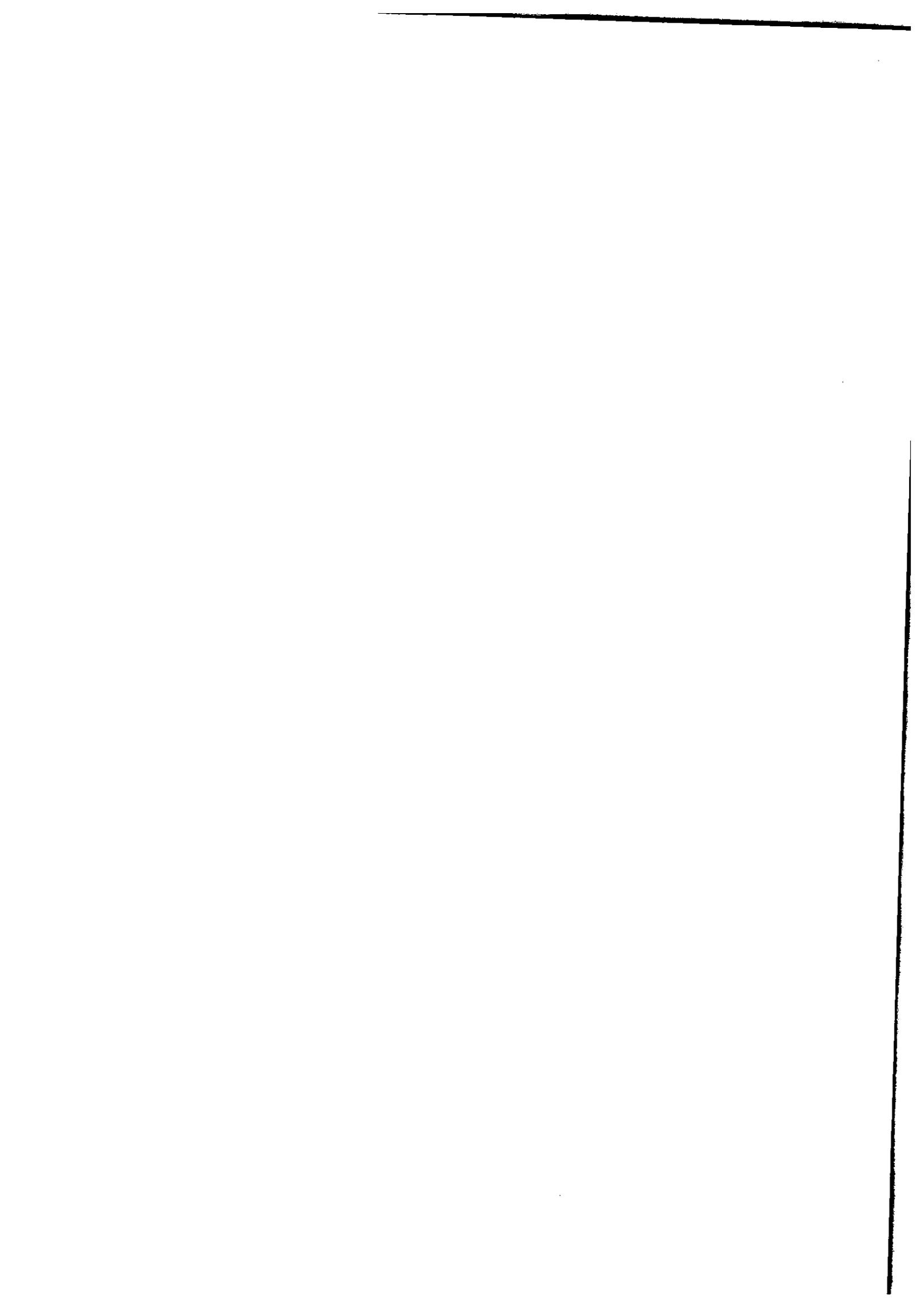## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

1.3.2 Course that include Experiential Learning through Project Work/Field work/Internship during 2022-23

S.No	Title of Final Year Project	Subject code & Subjects name related to the Projects
1	FOOTSTEP POWER GENERATION USING PIEZO ELECTRIC SENSOR	EE8551-MICROPROCESSORS AND MICROCONTROLLERS EE8691-EMBEDDED SYSTEMS EE8702-POWER SYSTEM OPERTAION AND CONTROL EE8402-TRANSMISSION AND DISTRIBUTION ME8792-POWER PLANT ENGINEERING
2	AUTOMATIC CAR WIPER SYSTEM USING ARDUINO UNO	EE8551-MICROPROCESSORS AND MICROCONTROLLERS EE8691 EMBEDDED SYSTEMS

HOD - EEE

Dr. JEHA. J

FOOT STEP POWER GENERATION USING PIEZOELECTRIC SENSOR

A PROJECT REPORT

Submitted by

FAHED S	**311819105001**
MOHAMED RIJWAN H	**311819105002**
BHUVANESH S	**311819105301**

In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

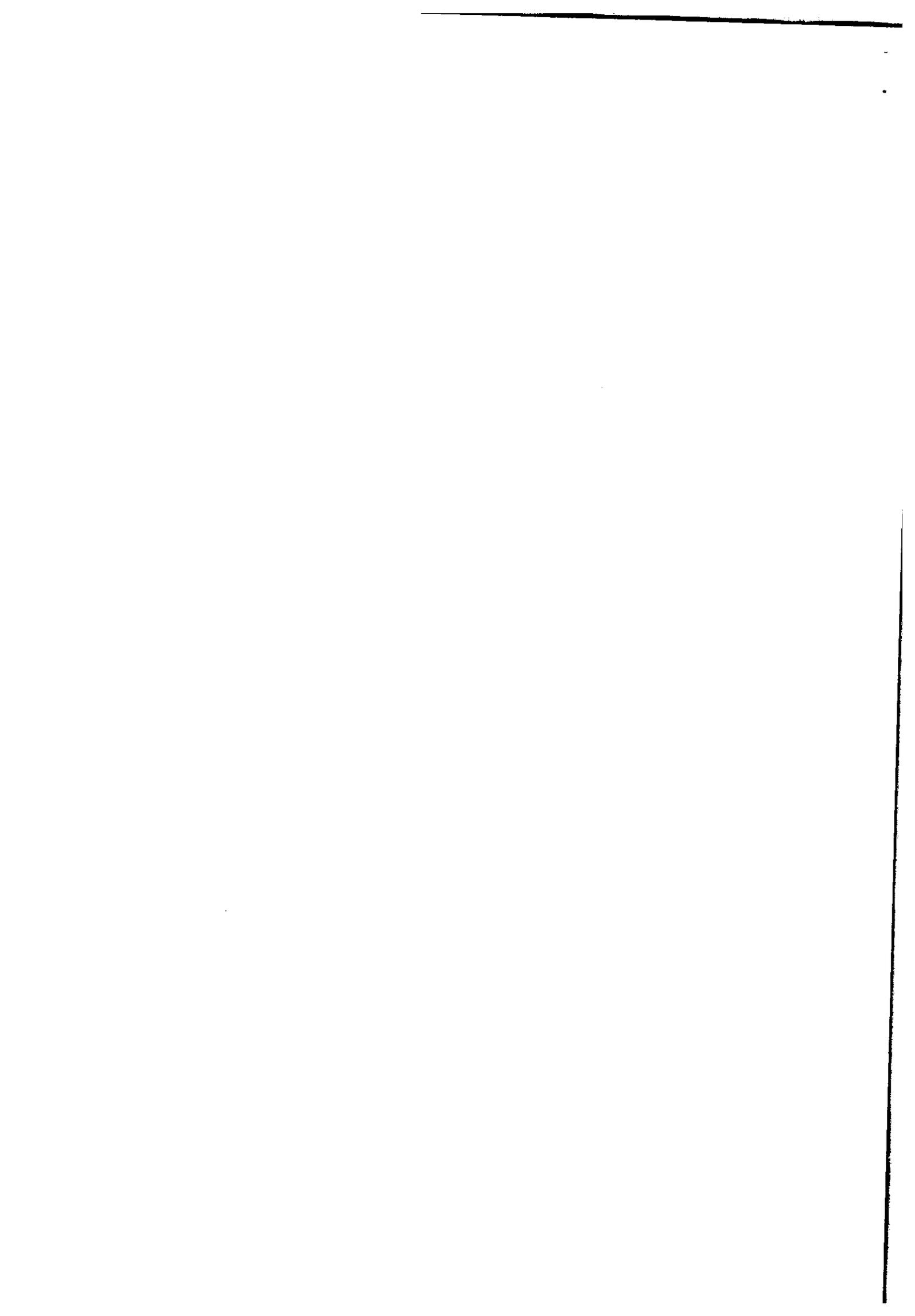## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MOHAMED SATHAK AJ COLLEGE OF ENGINEERING

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.

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE.

Certificate that this project report **"FOOT STEP POWER GENERATION USING PIEZOELECTRIC SENSOR"** is a bonafide work of **S BHUVANESH** (11819105301), **S FAHED (311819105001), H MOHAMMED RIJWAN** (11819105002) who carried out the project under my supervision.

SIGNATURE

Dr.JEHA.J M.E,Ph.D.,
HEAD OF THE DEPARTMENT

Department of EEE

Mohamed Sathak AJ College of Engineering,
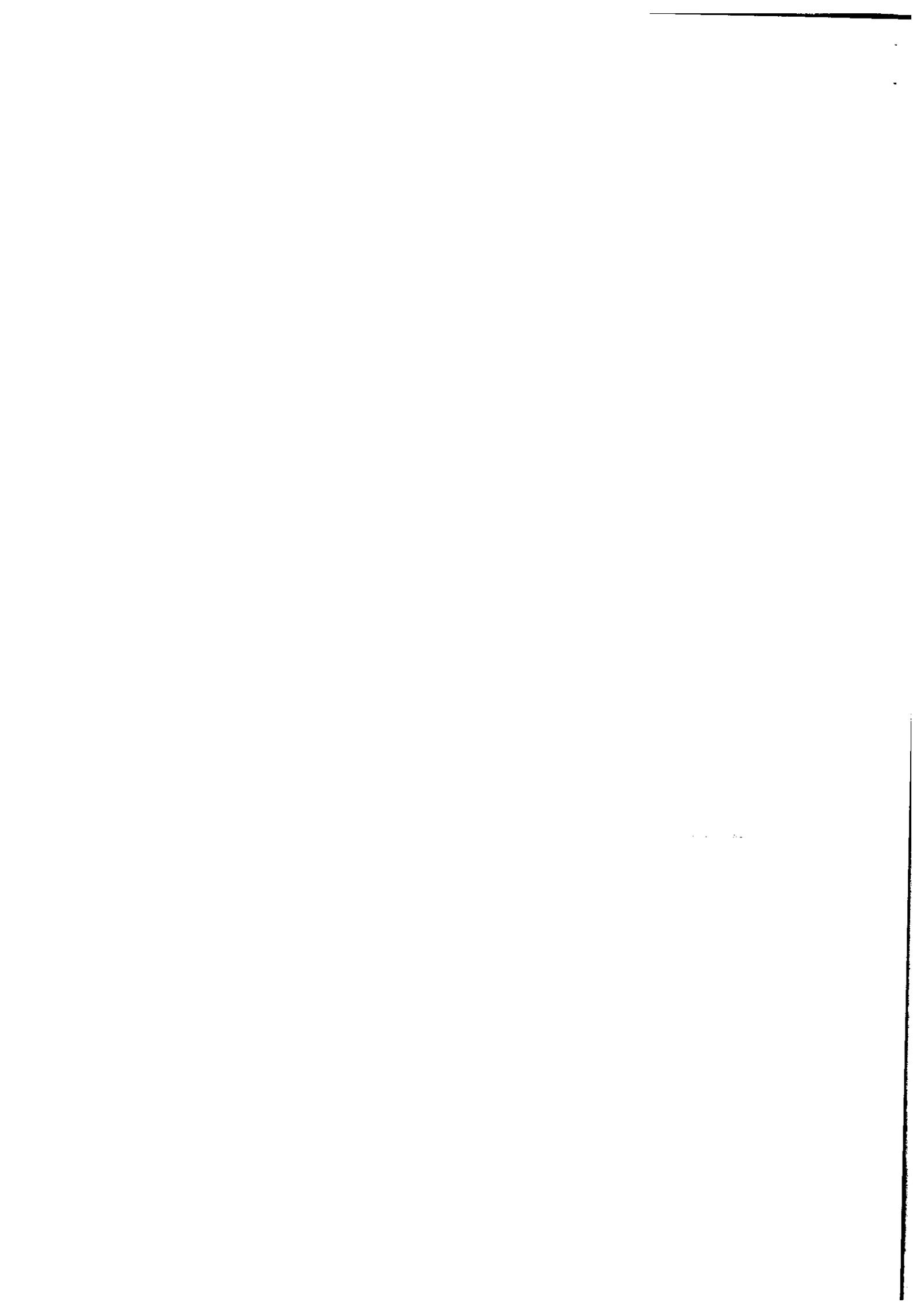Chennai-603103

SIGNATURE

Dr.JEHA.J M.E,Ph.D.,
HEAD OF THE DEPARTMENT

Department of EEE

Mohamed Sathak AJ College of Engineering,
Chennai-601103

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

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

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

This project proposes a system for generating electrical power from the mechanical energy produced by human footsteps using piezoelectric sensors. Piezoelectric sensors are a type of transducer that can convert mechanical energy into electrical energy. The proposed system consists of several piezoelectric sensors placed under a floor or a pathway that can detect and convert the pressure exerted by human footsteps into electrical energy. This energy can be stored in batteries or capacitors and used to power low-power electronic devices. An Arduino Nano is used to control and monitor the system, which includes an LCD display to show the power generated by the system.

The project aims to demonstrate the feasibility of generating electrical power from human footsteps and its potential for use in various applications, such as public spaces, airports, and shopping malls, to reduce energy consumption and promote sustainability. Footstep power generation using piezoelectric sensors is an innovative approach to harvesting renewable energy from human footsteps. The system utilizes piezoelectric sensors, which generate an electrical charge in response to mechanical pressure, to convert the mechanical energy from footsteps into electrical energy. This energy can be used to power low-power devices, such as LED lights or small electronic gadgets.

The system's design involves the use of an Arduino nano microcontroller, a piezoelectric sensor, a 12V battery, a charging port, and a 16*2 LCD display. The piezoelectric sensor is placed beneath a mat, and as people walk over the mat, the sensor generates an electrical charge, which is then stored in the battery or used to power devices. The system has several advantages, including being a sustainable source of energy, having low maintenance costs, and being environmentally friendly. However, the system also has some disadvantages, such as low power output and sensitivity to environmental factors.
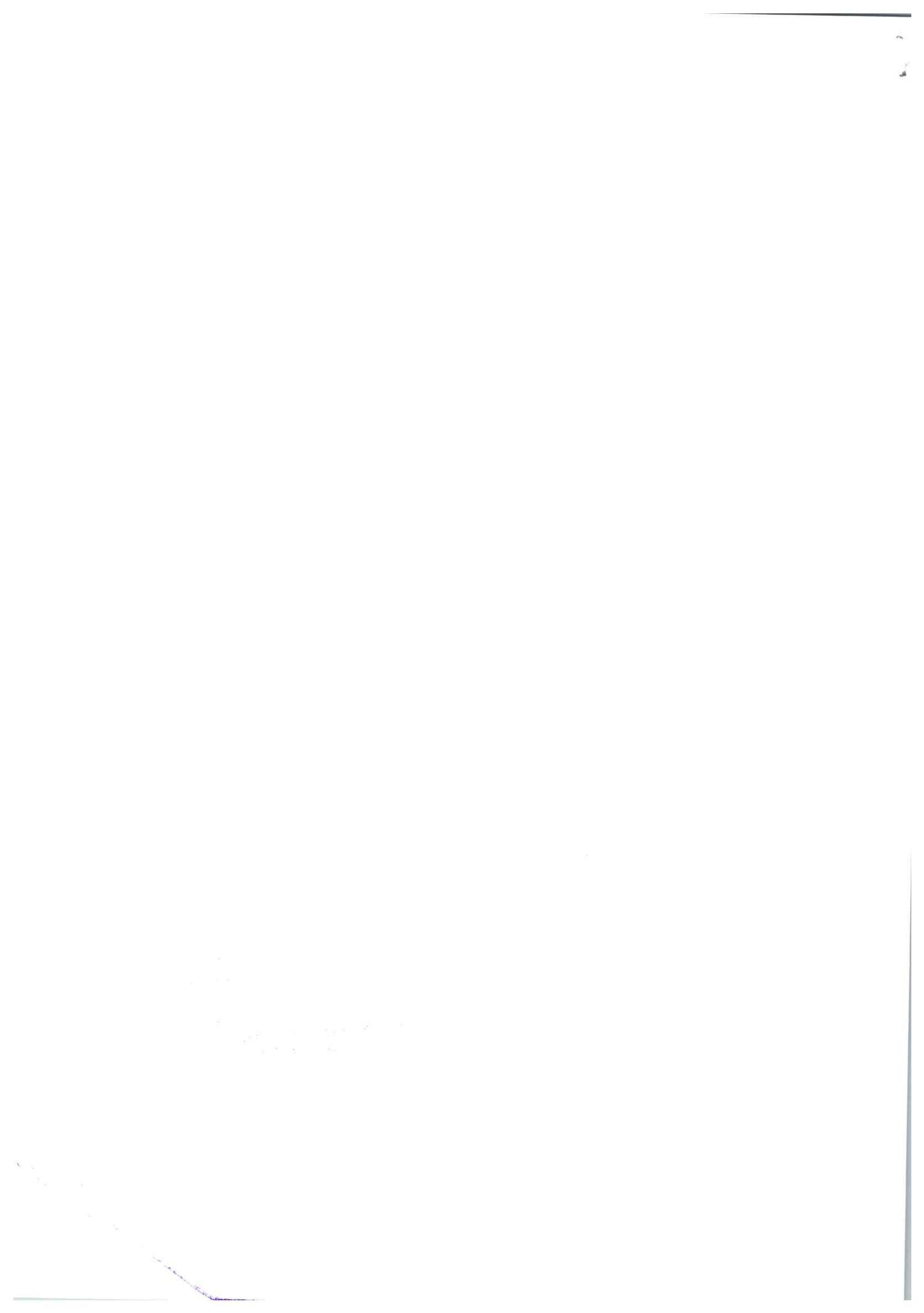
4
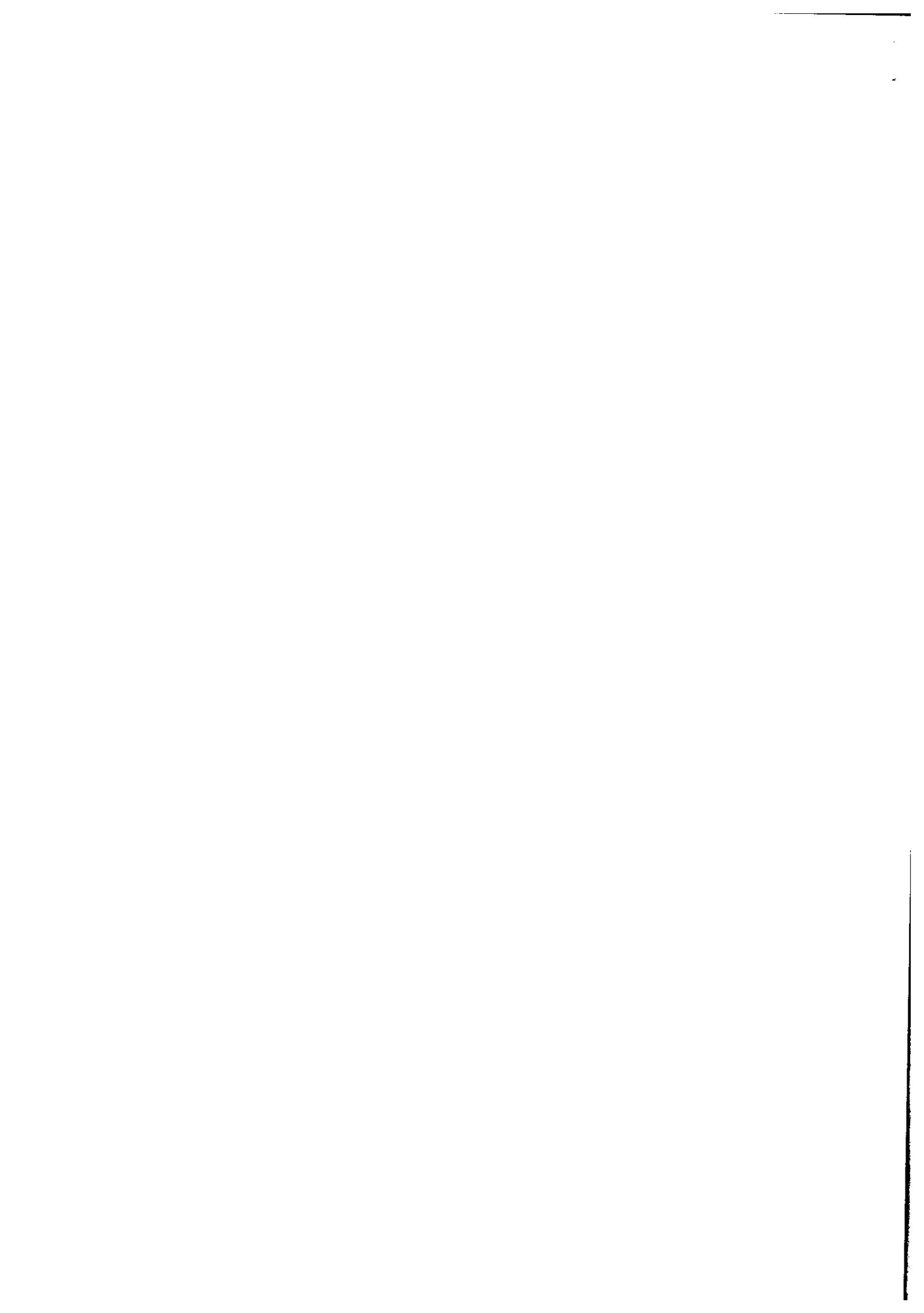
CHAPTER 9

CONCLUSION

In conclusion, the footstep power generation using piezoelectric sensors is an innovative and sustainable system that can generate electrical energy by harvesting the kinetic energy produced by people walking. The system has several advantages, such as its low cost, simple implementation, and ability to generate energy without any emissions or pollution.Although the system has some limitations, such as its low power output and sensitivity to environmental factors, it has the potential to be used in a variety of applications, such as powering street lights, public transport systems, and smart buildings.Overall, the footstep power generation using piezoelectric sensors is a promising technology that can contribute to the development of sustainable and energy-efficient solutions for the future.The result of the footstep power generation using piezoelectric sensors can vary depending on several factors, such as the number and placement of the sensors, the weight and movement of the people walking, and the efficiency of the energy conversion process.In general, the system can generate a small amount of electrical energy, typically in the range of milliwatts to a few watts, depending on the factors mentioned above. This energy can be stored in batteries or capacitors and used to power low-power devices, such as LED lights or small electronic gadgets.It is important to note that the system's performance may vary depending on the specific implementation and the environment in which it is used. Therefore, it is essential to conduct thorough testing and evaluation to determine the system's optimal design and performance characteristics.

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

30

POWER SYSTEM OPERATION AND CONTROL

L	T	P	C
3	0	0	3

OBJECTIVES:
To impart knowledge on the following topics

- Significance of power system operation and control.
- Real power-frequency interaction and design of power-frequency controller.
- Reactive power-voltage interaction and the control actions to be implemented for maintaining the voltage profile against varying system load.
- Economic operation of power system.
- SCADA and its application for real time operation and control of power systems

**UNIT I   PRELIMINARIES ON POWER SYSTEM OPERATION AND   9
                CONTROL**
Power scenario in Indian grid – National and Regional load dispatching centers – requirements of good power system - necessity of voltage and frequency regulation - real power vs frequency and reactive power vs voltage control loops - system load variation, load curves and basic concepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generators in parallel.

UNIT II   REAL POWER - FREQUENCY CONTROL   9
Load Frequency Control (LFC) of single area system-static and dynamic analysis of uncontrolled and controlled cases - LFC of two area system - tie line modeling - block diagram representation of two area system - static and dynamic analysis - tie line with frequency bias control – state variability model - integration of economic dispatch control with LFC.

UNIT III   REACTIVE POWER – VOLTAGE CONTROL   9
Generation and absorption of reactive power - basics of reactive power control – Automatic Voltage Regulator (AVR) – brushless AC excitation system – block diagram representation of AVR loop - static and dynamic analysis – stability compensation – voltage drop in transmission line - methods of reactive power injection - tap changing transformer, SVC (TCR + TSC) and STATCOM for voltage control.

UNIT IV   ECONOMIC OPERATION OF POWER SYSTEM   9
Statement of economic dispatch problem - input and output characteristics of thermal plant - incremental cost curve - optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) - base point and participation factors method - statement of unit commitment (UC) problem - constraints on UC problem - solution of UC problem using priority list – special aspects of short term and long term hydrothermal problems.

UNIT V   COMPUTER CONTROL OF POWER SYSTEMS   9
Need of computer control of power systems-concept of energy control centers and functions – PMU - system monitoring, data acquisition and controls - System hardware configurations - SCADA and EMS functions - state estimation problem – measurements and errors - weighted least square estimation - various operating states - state transition diagram.

OUTCOMES:
- Ability to understand the day-to-day operation of electric power system.
- Ability to analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand.
- Ability to understand the significance of power system operation and control.
- Ability to acquire knowledge on real power-frequency interaction.
- Ability to understand the reactive power-voltage interaction.
- Ability to design SCADA and its application for real time operation.

TEXT BOOKS:
1. Olle.I.Elgerd, 'Electric Energy Systems theory - An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010.
2. Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 2016.
3. Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010.

REFERENCES
1. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
2. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
3. Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

EE8703	RENEWABLE ENERGY SYSTEMS	L	T	P	C
		3	0	0	3

**OBJECTIVES:**
To impart knowledge on the following Topics
- Awareness about renewable Energy Sources and technologies.
- Adequate inputs on a variety of issues in harnessing renewable Energy.
- Recognize current and possible future role of renewable energy sources.

PRINCIPAL
Mohamed Sathak A.J. College of Engineering

UNIT I   RENEWABLE ENERGY (RE) SOURCES   **9**
Environmental consequences of fossil fuel use, Importance of renewable sources of energy, Sustainable Design and development, Types of RE sources, Limitations of RE sources, Present Indian and international energy scenario of conventional and RE sources.

UNIT II   WIND ENERGY   **9**
Power in the Wind – Types of Wind Power Plants(WPPs)–Components of WPPs-Working of WPPs- Siting of WPPs-Grid integration issues of WPPs.
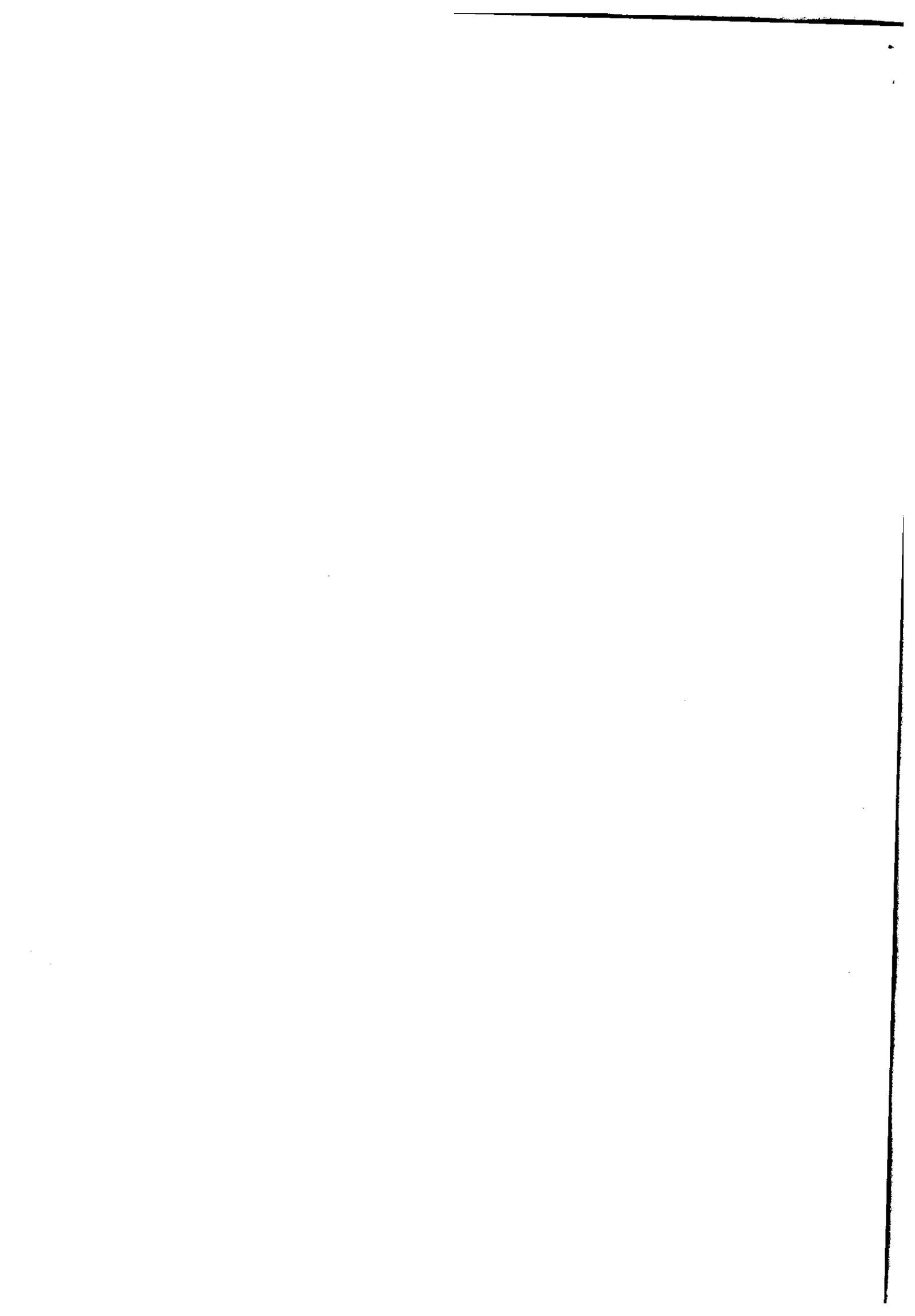
OUTCOMES:
- Ability to understand the construction and working principle of Synchronous Generator
- Ability to understand MMF curves and armature windings.
- Ability to acquire knowledge on Synchronous motor.
- Ability to understand the construction and working principle of Three phase Induction Motor
- Ability to understand the construction and working principle of Special Machines
- Ability to predetermine the performance characteristics of Synchronous Machines.

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

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

EE8402	TRANSMISSION AND DISTRIBUTION	L	T	P	C
		3	0	0	3

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

UNIT I   TRANSMISSION LINE PARAMETERS   9
Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects -Typical configurations, conductor types and electrical parameters of EHV lines.

UNIT II   MODELLING AND PERFORMANCE OF TRANSMISSION LINES   9

Performance of Transmission lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines - Power Circle diagrams - Formation of Corona – Critical Voltages – Effect on Line Performance.

UNIT III   MECHANICAL DESIGN OF LINES   9

Mechanical design of OH lines – Line Supports –Types of towers – Stress and Sag Calculation – Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT IV   UNDER GROUND CABLES   9

Underground cables - Types of cables – Construction of single core and 3 core cables - Insulation Resistance – Potential Gradient - Capacitance of Single-core and 3 core cables - Grading of cables - Power factor and heating of cables – DC cables.

UNIT V   DISTRIBUTION SYSTEMS   9

Distribution Systems – General Aspects – Kelvin's Law – AC and DC distributions - Techniques of Voltage Control and Power factor improvement – Distribution Loss –Types of Substations -Methods of Grounding – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).
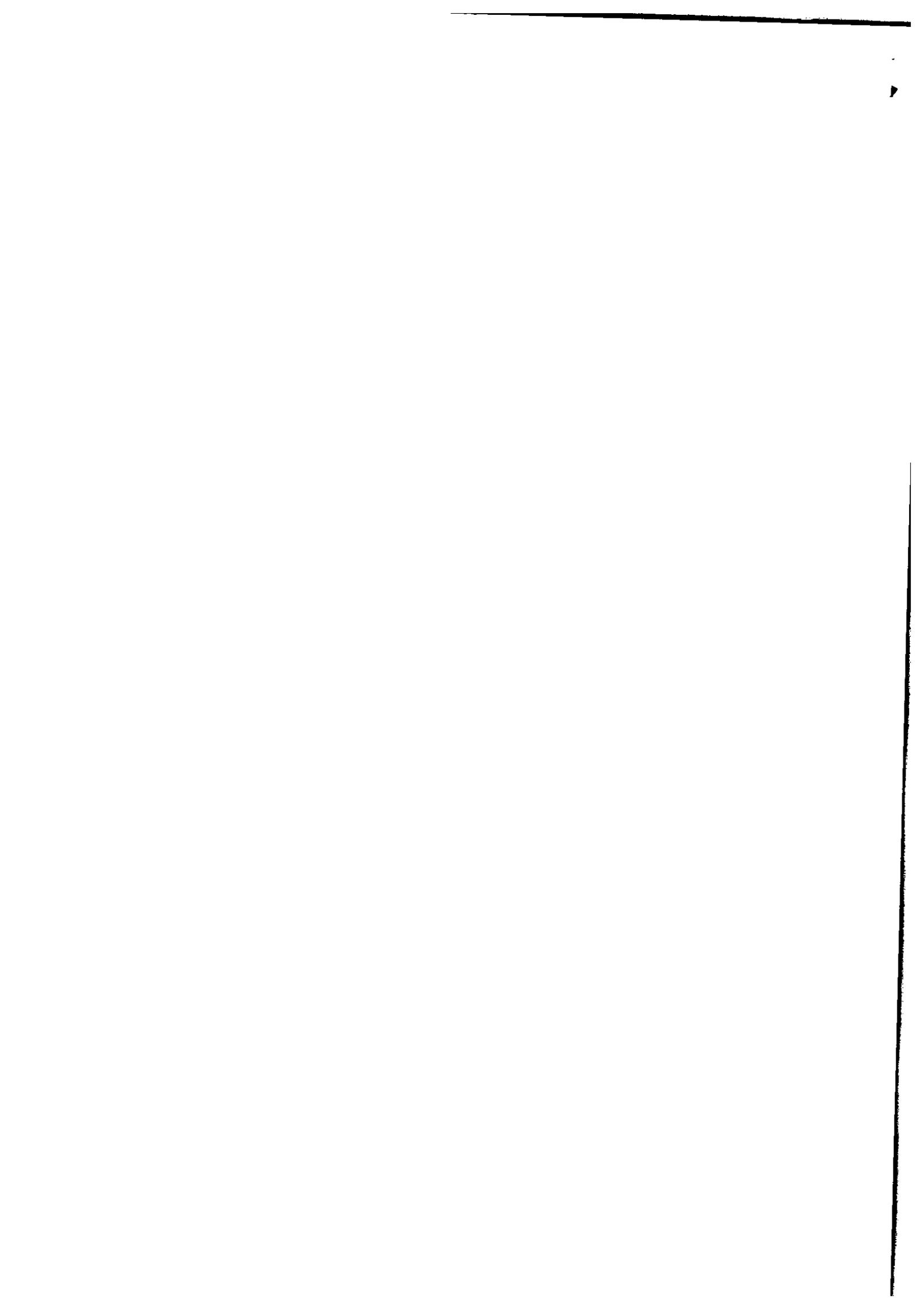
TOTAL :   45   PERIODS

OUTCOMES:

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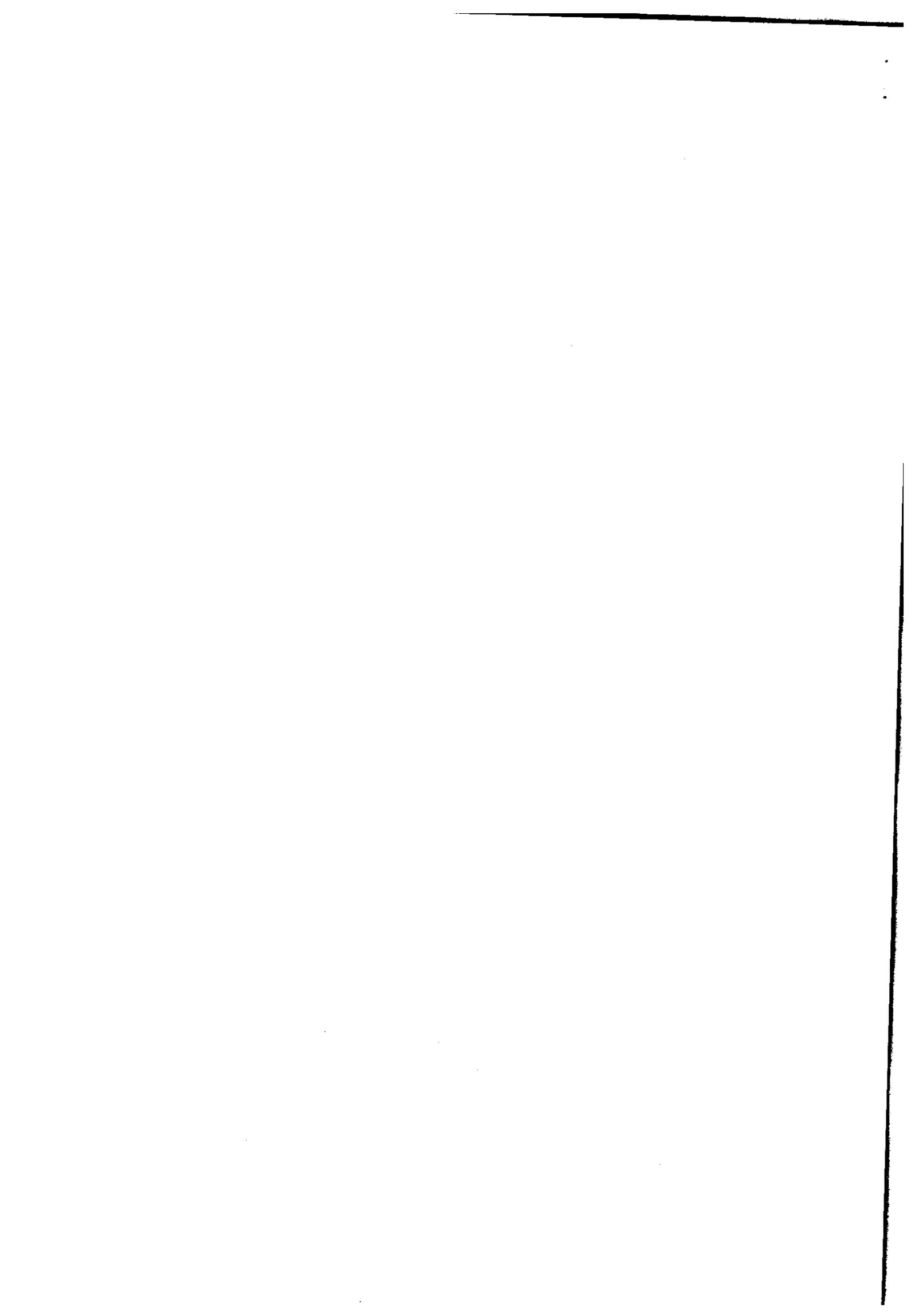
TEXT BOOKS:

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

REFERENCES

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

6. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 2013

EE8403	MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

OBJECTIVES:
To impart knowledge on the following Topics
- Basic functional elements of instrumentation
- Fundamentals of electrical and electronic instruments
- Comparison between various measurement techniques
- Various storage and display devices
- Various transducers and the data acquisition systems

UNIT I   INTRODUCTION   **9**
Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration-Principle and types of analog and digital voltmeters, ammeters.

UNIT II   ELECTRICAL AND ELECTRONIC INSTRUMENTS   **9**
Principle and types of multi meters – Single and three phase watt meters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT III   COMPARATIVE METHODS OF MEASUREMENTS   **9**
D.C potentiometers, D.C (Wheat stone, Kelvin and Kelvin Double bridge) & A.C bridges (Maxwell, Anderson and Schering bridges), transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic Interference – Grounding techniques.

UNIT IV   STORAGE AND DISPLAY DEVICES   **9**
Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & Dot matrix display – Data Loggers.

UNIT V   TRANSDUCERS AND DATA ACQUISITION SYSTEMS   **9**
Classification of transducers – Selection of transducers – Resistive, capacitive & inductive Transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – Smart sensors-Thermal Imagers.

                                                    TOTAL :   45   PERIODS

OUTCOMES:
- To acquire knowledge on Basic functional elements of instrumentation
- To understand the concepts of Fundamentals of electrical and electronic instruments
- Ability to compare between various measurement techniques
- To acquire knowledge on Various storage and display devices
- To understand the concepts Various transducers and the data acquisition systems
- Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.

AUTOMATIC CAR WIPER SYSTEM USING ARDUINO UNO

A PROJECT REPORT

Submitted by

SATHIYAN.S	311819105003
STALIN.K	311819105005
AKRAM MOHIUDDIN.F	311819105302

In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

IN

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MOHAMED SATHAK AJ COLLEGE OF ENGINEERING

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.

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE.

lificate that this project report **"AUTOMATIC CAR WIPER SYSTEM USING
DUINO UNO"** is a bonafide work of **S.SATHIYAN (311819105003), K.STALIN
1819105005), F.AKRAM MOHIUDDIN (311819105302)** who carried out the project under

supervision.

SIGNATURE

SIGNATURE

Dr.JEHA.J M.E,Ph.D.,

HEAD OF THE DEPARTMENT

Dr.KAMALASELVAN M.E,Ph.D.,

SUPERVISOR

ASSISSTANT PROFESSOR

Department of EEE

Department of EEE

Mohamed Sathak AJ College of Engineering,
Chennai-603103

Mohamed Sathak AJ College of Engineering,
Chennai-601103

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

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

Working of a windshield wiper is a manual procedure which requires to be switched on to remove rainfall and debris from the screen. This does not only require driver's attention, but also, causes certain level of discomfort to the driver and serves as a source of distraction which increases the risk of accidents.

To offer comfort to the driver and essentially reduce the risk of accidents, an automatic rain sensing device has become a necessity. While such a device is available in the market, its high cost and other such limitations have made it less popular in the automobile industry. Aim of this work was to propose another such model in market that limits the cost while maintaining the efficacy.

A rain sensor, a microcontroller and a driver integrated circuit (IC) are the major components used in the construction and seamless working of the proposed device. Falling water is quickly and precisely detected by the rain sensor which then transmits the signal to the second component i.e. microcontroller which in turn energizes the driver IC to switch the required motion of the wipers on using servo motor. This device converts a cumbersome manual operation to a smooth automatic one.

While driving car, driver cannot see on road vehicles. So he tries operating wiper on glass, for that he should often switch on for operating wiper and because of this it might cause vehicle accident. If we apply any kind of sensor on glass which senses the act of sprinkling water, by automation the wiper will be operating automatically. When the water hit the sensor, it will send signal to the system thus moving the wiper motor.

Once the sensor did not detect any water, the wiper will stop. This will reduce the weaknesses which have been stated at beginning. Additional plan to this invention is to make the wiper automatically push up from the windscreen when the engine shut off.

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

vii

CHAPTER 7

CONCLUSION

The automatic car wiper system was developed to sense the rain and wipe the glass by ving the windshield wipers. By using automatic car wiper system, the purpose of driver's ponse to control the wiper is automated. It is demonstrated and proved that the rain sensors ponse to the rain for moving the windshield wipers is less than 400 milliseconds.

Though the automatic car wiper is designed using rain sensor and Arduino, it can be anced by replacing the rain sensors with IR sensors for accurately determining and detecting rainfall. If you opt for using a wiper which is not only economical but also efficient, using a sensor is the best. To advance the movement and to change the system different sensors ich are useful for this purpose can be selected.

TURE SCOPE

The future scope of automatic car wipers is promising, with advancements in technology innovations in the automotive industry. Here are some potential areas of development for omatic car wipers:

Integration with other car sensors: Automatic car wipers could be integrated with other sors in the car, such as cameras and radars, to provide a more comprehensive and advanced er assistance system. This integration could allow the wipers to adjust their speed and quency based on the speed of the car, distance from other vehicles, and other road conditions.

Improved rain sensing technology: New advancements in rain sensing technology could lt in even more accurate and sensitive rain sensors. This could allow the wipers to detect isture more quickly and adjust their performance accordingly.

Energy-efficient systems: Future automatic car wipers could be designed to be more rgy-efficient, reducing the load on the car's electrical system and improving fuel efficiency.

- Ability to acquire knowledge on Fault analysis.
- Ability to model and understand various power system components and carry out power flow, short circuit and stability studies.

TEXT BOOKS:
1. John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

REFERENCES
1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.
2. J. Duncan Glover, Mulukutla S.Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
3. Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001.
4. Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

EE8551	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

OBJECTIVES:
To impart knowledge on the following Topics
- Architecture of µP8085 & µC 8051
- Addressing modes & instruction set of 8085 & 8051.
- Need & use of Interrupt structure 8085 & 8051.
- Simple applications development with programming 8085 & 8051

UNIT I   8085 PROCESSOR   9
Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts.

UNIT II   PROGRAMMING OF 8085 PROCESSOR

9

Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions – Programming: Loop structure with counting & Indexing – Look up tability - Subroutine instructions - stack.

UNIT III   8051 MICRO CONTROLLER   9
Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts– Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

UNIT IV   PERIPHERAL INTERFACING   9

Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279, - A/D and D/A converters &Interfacing with 8085& 8051.

UNIT V   MICRO CONTROLLER PROGRAMMING & APPLICATIONS   9

Simple programming exercises- key board and display interface –Control of servo motor- stepper motor control- Application to automation systems.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051.
- Ability to need & use of Interrupt structure 8085 & 8051.
- Ability to understand the importance of Interfacing
- Ability to explain the architecture of Microprocessor and Microcontroller.
- Ability to write the assembly language programme.
- Ability to develop the Microprocessor and Microcontroller based applications.

TEXT BOOKS:

1. Sunil Mathur &Jeebananda Panda, "Microprocessor and Microcontrollers", PHI Learning Pvt. Ltd, 2016.
2. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013.
3. Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.

REFERENCES

1. Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.
2. B.RAM," Computer Fundamentals Architecture and Organization" New age International Private Limited, Fifth edition, 2017.
3. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.
4. Ajay V.Deshmukh, 'Microcontroller Theory &Applications', McGraw Hill Edu,2016
5. Douglas V.Hall, 'Microprocessor and Interfacing', McGraw Hill Edu,2016.

EE8552	POWER ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- Different types of power semiconductor devices and their switching
- Operation, characteristics and performance parameters of controlled rectifiers
- Operation, switching techniques and basics topologies of DC-DC switching regulators.
- Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
- Operation of AC voltage controller and various configurations.

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

- Ability to acquire knowledge on Fault analysis.
- Ability to model and understand various power system components and carry out power flow, short circuit and stability studies.

TEXT BOOKS:
1. John J. Grainger, William D. Stevenson, Jr, 'Power System Analysis', Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.
2. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008.
3. Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.

REFERENCES
1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.
2. J. Duncan Glover, Mulukutla S.Sarma, Thomas J. Overbye, 'Power System Analysis & Design', Cengage Learning, Fifth Edition, 2012.
3. Gupta B.R., 'Power System - Analysis and Design', S. Chand Publishing, 2001.
4. Kundur P., 'Power System Stability and Control', Tata McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.

EE8551	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

OBJECTIVES:
To impart knowledge on the following Topics
- Architecture of μP8085 & μC 8051
- Addressing modes & instruction set of 8085 & 8051.
- Need & use of Interrupt structure 8085 & 8051.
- Simple applications development with programming 8085 & 8051

UNIT I   8085 PROCESSOR   9
Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts.

UNIT II   PROGRAMMING OF 8085 PROCESSOR
                                                                                    9
Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation& control instructions – Programming: Loop structure with counting & Indexing – Look up tability - Subroutine instructions - stack.

UNIT III   8051 MICRO CONTROLLER   9
Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts- Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

UNIT IV   PERIPHERAL INTERFACING   9
Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279, - A/D and D/A converters &Interfacing with 8085& 8051.

UNIT V   MICRO CONTROLLER PROGRAMMING & APPLICATIONS   9
Simple programming exercises- key board and display interface –Control of servo motor- stepper motor control- Application to automation systems.

                                               TOTAL :   45   PERIODS
OUTCOMES:
  • Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051.
  • Ability to need & use of Interrupt structure 8085 & 8051.
  • Ability to understand the importance of Interfacing
  • Ability to explain the architecture of Microprocessor and Microcontroller.
  • Ability to write the assembly language programme.
  • Ability to develop the Microprocessor and Microcontroller based applications.

TEXT BOOKS:
  1. Sunil Mathur &Jeebananda Panda, "Microprocessor and Microcontrollers", PHI Learning Pvt. Ltd, 2016.
  2. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013.
  3. Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.

REFERENCES
  1. Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.
  2. B.RAM," Computer Fundamentals Architecture and Organization" New age International Private Limited, Fifth edition, 2017.
  3. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.
  4. Ajay V.Deshmukh, 'Microcontroller Theory &Applications', McGraw Hill Edu,2016
  5. Douglas V.Hall, 'Microprocessor and Interfacing', McGraw Hill Edu,2016.

EE8552	POWER ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:
To impart knowledge on the following Topics
  • Different types of power semiconductor devices and their switching
  • Operation, characteristics and performance parameters of controlled rectifiers
  • Operation, switching techniques and basics topologies of DC-DC switching regulators.
  • Different modulation techniques of pulse width modulated inverters and to understand harmonic reduction methods.
  • Operation of AC voltage controller and various configurations.

- Ability to analyze the characteristics and functions of relays and protection schemes.
- Ability to study about the apparatus protection, static and numerical relays.
- Ability to acquire knowledge on functioning of circuit breaker.

TEXT BOOKS:
1. Sunil S.Rao, 'Switchgear and Protection', Khanna Publishers, New Delhi, 2008.
2. B.Rabindranath and N.Chander, 'Power System Protection and Switchgear', New Age International (P) Ltd., First Edition 2011.
3. Arun Ingole, 'Switch Gear and Protection' Pearson Education, 2017.

REFERENCES
1. BadriRam ,B.H. Vishwakarma, 'Power System Protection and Switchgear', New Age InternationalPvt Ltd Publishers, Second Edition 2011.
2. Y.G.Paithankar and S.R.Bhide, 'Fundamentals of power system protection', Second Edition,Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. C.L.Wadhwa, 'Electrical Power Systems', 6th Edition, New Age International (P) Ltd., 2010
4. RavindraP.Singh, 'Switchgear and Power System Protection', PHI Learning Private Ltd., NewDelhi, 2009.
5. VK Metha," Principles of Power Systems" S. Chand, 2005.

6. Bhavesh Bhalja, R.P. Maheshwari, Nilesh G. Chotani,'Protection and Switchgear' Oxford University Press, 2011.

EE8691	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

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

UNIT I   INTRODUCTION TO EMBEDDED SYSTEMS   9
Introduction to Embedded Systems –Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II   EMBEDDED NETWORKING   9
Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols RS232 standard – RS422 – RS 485 - CAN Bus -Serial Peripheral Interface (SPI) –Inter Integrated Circuits (I²C) –need for device drivers.

UNIT III   EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT   9
Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model,

Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV   RTOS BASED EMBEDDED SYSTEM DESIGN   9
Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance.

UNIT V   EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT   9
Case Study of Washing Machine- Automotive Application- Smart card System Application-ATM machine –Digital camera

                                    TOTAL :   45   PERIODS

OUTCOMES:
- Ability to understand and analyze Embedded systems.
- Ability to suggest an embedded system for a given application.
- Ability to operate various Embedded Development Strategies
- Ability to study about the bus Communication in processors.
- Ability to acquire knowledge on various processor scheduling algorithms.
- Ability to understand basics of Real time operating system.

TEXT BOOKS:
1. Peckol, "Embedded system Design", John Wiley & Sons,2010
2. Lyla B Das," Embedded Systems-An Integrated Approach", Pearson, 2013
3. Shibu. K.V, "Introduction to Embedded Systems", 2e, Mc graw Hill, 2017.

REFERENCES
1. Raj Kamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.
2. C.R.Sarma, "Embedded Systems Engineering", University Press (India) Pvt. Ltd, 2013.
3. Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.
4. Han-Way Huang, "Embedded system Design Using C8051", Cengage Learning, 2009.
5. Rajib Mall "Real-Time systems Theory and Practice" Pearson Education, 2007.

EE8661	POWER ELECTRONICS AND DRIVES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:
- To provide hands on experience with power electronic converters and testing.

LIST OF EXPERIMENTS
1   Gate Pulse Generation using R, RC and UJT.
2   Characteristics of SCR and TRIAC
3   Characteristics of MOSFET and IGBT
4   AC to DC half controlled converter
5   AC to DC fully controlled Converter
6   Step down and step up MOSFET based choppers
7   IGBT based single phase PWM inverter

MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

1.3.2 Course that include Experiential Learning through Project Work/Field work/Internship during 2022-23

S.No	Register No	Name of the student	Year of Study	Company Name	Date
1	311820105005	Imran R	III	RR Electronics	29/9/22 to 30/9/22
2	311820105011	Thoufiq Ahamed T	III	Lenovo	18/8/22 to 31/8/22
3	311820105010	Syed Harrun S	III	Lenovo	18/8/22 to 31/8/22
4	311820105006	Mohamed Rasith M	III	Lenovo	18/8/22 to 31/8/22
5	311820105701	Mohamed Unias A	III	Lenovo	18/8/22 to 31/8/22
6	311820105012	Thowfiq M	III	Lenovo	18/8/22 to 31/8/22
7	311819105301	Bhuvanesh S	IV	Daffodil	8/8/22 to 4/10/22
8	311821105013	Syed Hifzul Rahman F	II	Verzeo	1/9/22 to 31/10/22

HOD - EEE
Dr. JEHA. J

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

RR ELECTRONICS

RR

Door No. 3/459, Plot No.22, Sri Venkateswara Nagar, First Street,
Kottivakkam, Chennai-600 041 Phone : 2451 4049, 2451 2026
e-mail : rrelectronics87@gmail.com raraelex@yahoo.co.in
website : www.rrcalibrations.com
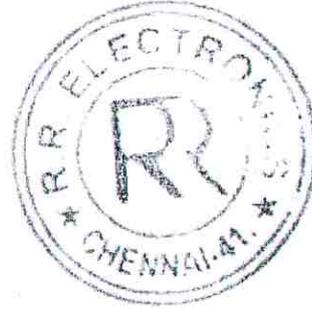
Date: 01/10/2022

TO WHOMSOEVER IT MAY CONCERN

INTERNSHIP CERTIFICATE

This is to certify that Mr.Imran B.E (EEE) III Year (Reg : 311820105005) of Mohamed Sathak A.J. College of Engineering has undergone a two days hands on internship program on calibration of Instruments on site from 29.09.2022 to 30.09.2022.

For RR Electronics

VAISHNAVI ARUN
(PARTNER)

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

6. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 2013

EE8403   **MEASUREMENTS AND INSTRUMENTATION**   L T P C
                                                                      3 0 0 3

OBJECTIVES:
To impart knowledge on the following Topics
- Basic functional elements of instrumentation
- Fundamentals of electrical and electronic instruments
- Comparison between various measurement techniques
- Various storage and display devices
- Various transducers and the data acquisition systems

UNIT I   INTRODUCTION   9
Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration- Principle and types of analog and digital voltmeters, ammeters.

UNIT II   ELECTRICAL AND ELECTRONIC INSTRUMENTS   9
Principle and types of multi meters – Single and three phase watt meters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT III   COMPARATIVE METHODS OF MEASUREMENTS   9
D.C potentiometers, D.C (Wheat stone, Kelvin and Kelvin Double bridge) & A.C bridges (Maxwell, Anderson and Schering bridges), transformer ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic Interference – Grounding techniques.

UNIT IV   STORAGE AND DISPLAY DEVICES   9
Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & Dot matrix display – Data Loggers.

UNIT V   TRANSDUCERS AND DATA ACQUISITION SYSTEMS   9
Classification of transducers – Selection of transducers – Resistive, capacitive & inductive Transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – Smart sensors-Thermal Imagers.

                                             TOTAL :   45   PERIODS
OUTCOMES:
- To acquire knowledge on Basic functional elements of instrumentation
- To understand the concepts of Fundamentals of electrical and electronic instruments
- Ability to compare between various measurement techniques
- To acquire knowledge on Various storage and display devices
- To understand the concepts Various transducers and the data acquisition systems
- Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.

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

TEXT BOOKS:
1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2010.
2. J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria & Sons, Delhi, 2013.
3. Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, McGraw Hill Education Pvt. Ltd., 2007.

REFERENCES
1. H.S. Kalsi, 'Electronic Instrumentation', McGraw Hill, III Edition 2010.
2. D.V.S. Murthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2015.
3. David Bell, ' Electronic Instrumentation & Measurements', Oxford University Press, 2013.
4. Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.
5. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.

EE8451	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES:
To impart knowledge on the following topics
- Signal analysis using Op-amp based circuits.
- Applications of Op-amp.
- Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.
- IC fabrication procedure.

UNIT I   IC FABRICATION   9
IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II   CHARACTERISTICS OF OPAMP   9
Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers, summer, differentiator and integrator-V/I & I/V converters.

UNIT III   APPLICATIONS OF OPAMP   9
Instrumentation amplifier and its applications for transducer Bridge, Log and Antilog Amplifiers- Analog multiplier & Divider, first and second order active filters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit,-D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

UNIT IV   SPECIAL ICs   9
Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltage controlled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs.

UNIT V   APPLICATION ICs   9

58

07.09.2022

CERTIFICATE OF IN-PLANT TRAINING

This is to certify that **Mr. MOHAMED RASITH M** student of **MOHAMED SATHAK A.J. COLLEGE OF ENGINEERING** has undergone In-Plant Training in Manufacturing Operations for the period from **18.08.2022** to **31.08.2022**.

He has displayed professional acumen during the period of In-plant Training and we appreciate his interest in learning.

We wish him all success in his future endeavours.

For Lenovo (India) Pvt. Ltd.

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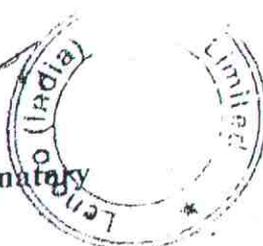
PRINCIPAL
Mohamed Sathak A.J. College of Engineering
No.34, Rajiv Gandhi Salai (OMR)
Sipcot - IT Highway Egattur,
Chenai - 603103.

voltage induced by faults -switching surges on integrated system Qualitative application of EMTP for transient computation.

OUTCOMES: **TOTAL :   45   PERIODS**

- Ability to understand and analyze switching and lightning transients.
- Ability to acquire knowledge on generation of switching transients and their control.
- Ability to analyze the mechanism of lighting strokes.
- Ability to understand the importance of propagation, reflection and refraction of travelling waves.
- Ability to find the voltage transients caused by faults.
- Ability to understand the concept of circuit breaker action, load rejection on integrated power system.

TEXT BOOKS:

1. Allan Greenwood, 'Electrical Transients in Power Systems', Wiley Inter Science, New York, 2nd Edition, 1991.
2. Pritindra Chowdhari, "Electromagnetic transients in Power System", John Wiley and Sons Inc.,   Second Edition, 2009.
3. C.S. Indulkar, D.P.Kothari, K. Ramalingam, 'Power System Transients – A statistical approach',   PHI Learning Private Limited, Second Edition, 2010.

REFERENCES

1. M.S.Naidu and V.Kamaraju, 'High Voltage Engineering', McGraw Hill, Fifth Edition, 2013.
2. R.D. Begamudre, 'Extra High Voltage AC Transmission Engineering', Wiley Eastern Limited,   1986.
3. Y.Hase, Handbook of Power System Engineering," Wiley India, 2012.
4. J.L.Kirtley, "Electric Power Principles, Sources, Conversion, Distribution and use," Wiley, 2012.
5. Akihiro ametani," Power System Transient theory and applications", CRC press, 2013.

GE8077   **TOTAL QUALITY MANAGEMENT**   L T P C
                                                                                           3 0 0 3
OBJECTIVE:

- To facilitate the understanding of Quality Management principles and process.

UNIT I   INTRODUCTION   9
Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II   TQM PRINCIPLES   9
Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I   9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II   9

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM   9

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--**ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

OUTCOME: **TOTAL: 45 PERIODS**

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXT BOOK:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. ISO9001-2015 standards

EE8011	FLEXIBLE AC TRANSMISSION SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES: To impart knowledge about the following topics:

- The start-of-art of the power system
- Performance of power systems with FACTS controllers.
- FACTS controllers for load flow and dynamic analysis

UNIT I INTRODUCTION   9

Real and reactive power control in electrical power transmission lines–loads & system compensation-Uncompensated transmission line–shunt and series compensation.

UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS   9

Voltage control by SVC–Advantages of slope in dynamic characteristics–Influence of SVC on system voltage–Design of SVC voltage regulator–TCR-FC-TCR-Modeling of SVC for power flow and fast transient stability– Applications: Enhancement of transient stability –

Date: 04.10.2022

TO WHOMSOEVER IT MAY CONCERN

This is to Certify that Bhuvanesh.S of Mohammed Sathak A.J. Engineering College, Reg .No.311819105301 has completed his internship in "**Digital Marketing** " in our Company from 8th August - 4th October 2022. He has learned skills from Designing and concepts of Digital Marketing. He has put his full effect which has been beneficial for the company. Wishing him a success in his future.

Thanking You,

Yours,

For DAFFODIL ESSENTIAL OILS

Partner

PRINCIPAL
Mohamed Sathak A.J. College of Engineering
No.6, Rajiv Gandhi Salai (OMR)
Sipcot - IT Highway Egattur,
Chenai - 603103.
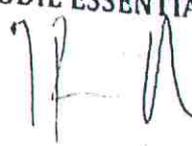
UNIT V   GLOBAL ISSUES

8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

OUTCOMES:

*   Upon completion of the course, the student should be ability to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi, 2013.
6. World Community Service Centre, ' Value Education', Vethathiri publications, Erode, 2011.

Web sources:

1.   www.onlineethics.org
2.   www.nspe.org
3.   www.globalethics.org
4.   www.ethics.org

MG8591   PRINCIPLES OF MANAGEMENT   LT P C
                                                                          3 0 0 3

OBJECTIVES:

*   To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.

UNIT I   INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

126

UNIT II   PLANNING

9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III   ORGANISING

9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV   DIRECTING

9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V   CONTROLLING

9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

OUTCOMES: **TOTAL: 45 PERIODS**

* Upon completion of the course, students will be ability to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXT BOOKS:
1. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.
2. Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.

REFERENCES:
1. Harold Koontz & Heinz Weihrich, "Essentials of Management", Tata McGraw Hill, 1998.
2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.
3. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management", 7th Edition, Pearson Education, 2011.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999

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

EEE

MVARO
merger & acquisitions

VERZEO

CERTIFICATE
OF INTERNSHIP

This certificate is proudly presented to

Syed Hifzul Rahman F

has successfully completed Embedded Systems live projects from MVARO in association with Verzeo

from 01-09-2022 to 31-10-2022.

During this internship, the student was found to be a keen and enthusiastic candidate.

T. Niht
Academic Head

23-11-2022
Date

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

Certificate ID: 836921689

3. W.Bolton, Programmable Logic Controllers, 6th Edition, Elseiver, 2015.
4. R.B. Northrop, 'Introduction to Instrumentation and Measurements', Taylor & Francis, New Delhi, 3rd Edition 2014.
5. E. O. Doebelin and D. N. Manik, "Measurement Systems – Application and Design", Tata McGraw-Hill, New Delhi, 6th Edition 2017.
6. R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	3	2	3	-	3	2	-	2	-	-	-	3	3	3	3
CO2	3	2	3	2	-	-	-		-	3	-	3	3	3	3
CO3	3	2	3	-	3	2	-		-	-	-	3	3	3	3
CO4	3	2	3	-			-	2	-	-	-	-	3	3	3
CO5	3	2	3	2	3	-	-		-	3	-	3	3	3	3
Avg	3	2	3	2	3	2	-	2	-	3	-	3	3	3	3

EE3404   **MICROPROCESSOR AND MICROCONTROLLER**   LT P C
3 0 0 3

COURSE OBJECTIVES:
- To study the addressing modes & instruction set of 8085 &8051
- To develop skills in simple program writing in assembly languages
- To introduce commonly used peripheral/interfacing ICs.
- To study and understand typical applications of micro-processors.
- To study and understand the typical applications of micro-controllers

UNIT I   INTRODUCTION TO 8085 ARCHITECTURE   9
Functional block diagram – Memory interfacing–I/O ports and data transfer concepts – Timing Diagram — Interrupt structure.

UNIT II   8085 INSTRUCTION SET AND PROGRAMMING   9
Instruction format and addressing modes — Assembly language format — Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing - Look up table - Subroutine instructions, stack.

UNIT III   INTERFACING BASICS AND ICS   9
Study of Architecture and programming of ICs: 8255 PPI, 8259PIC, 8251USART, 8279 Keyboard display controller and 8254 Timer/Counter – Interfacing with 8085 -A/D and D/A converter interfacing.

UNIT IV   INTRODUCTION TO 8051 MICROCONTROLLER   9
Functional block diagram - Instruction format and addressing modes – Interrupt structure – Timer – I/O ports – Serial communication, Simple programming –keyboard and display interface – Temperature control system –stepper motor control - Usage of IDE for assembly language programming.

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

UNIT V   INTRODUCTION TO RISC BASED ARCHITECTURE   9

PIC16 /18 architecture, Memory organization – Addressing modes – Instruction set - Programming techniques – Timers – I/O ports – Interrupt programming.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
Upon successful completion of the course, the students should have the:
CO1: Ability to write assembly language program for microprocessor and microcontroller
CO2: Ability to design and implement interfacing of peripheral with microprocessor and microcontroller
CO3: Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring.
CO4: Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring.
CO5: Ability to understand and appreciate advanced architecture evolving microprocessor field

TEXTBOOKS:
1. Ramesh S. Gaonkar, 'Microprocessor Architecture Programming and Application', Pen ram International (P)ltd., Mumbai, 6th Education, 2013.
2. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The 8051 Micro Controller and Embedded Systems', Pearson Education, Second Edition 2011.
3. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The PIC Micro Controller and Embedded Systems', 2010

REFERENCES:
1. Douglas V. Hall, "Micro-processors & Interfacing", Tata McGraw Hill 3rd Edition, 2017.
2. Krishna Kant, "Micro-processors & Micro-controllers", Prentice Hall of India, 2007.
3. Mike Predko, "8051 Micro-controllers", McGraw Hill, 2009
4. Kenneth Ayala, 'The 8051 Microcontroller', Thomson, 3rd Edition 2004.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO2	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO3	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO4	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
CO5	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
Avg	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3

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

EE3018   **EMBEDDED PROCESSORS**   **L T P C**
                                                                       2 0 2 3

COURSE OBJECTIVES:
- To introduce the architecture of the ARM processor.
- To train students in ARM programming.
- To discuss memory management, append location development with an ARM processor.
- To involve Discussions/ Practice/Exercise in revising & familiarizing the concepts
- To impart the knowledge on single board embedded processors.

UNIT I   ARM ARCHITECTURE   6
Architecture – Memory Organization – addressing modes -Registers – Pipeline - Interrupts – Coprocessors – Interrupt Structure

UNIT II   ARM MICROCONTROLLER PROGRAMMING   6
ARM general Instruction set – Thumb instruction set –Introduction to DSP on ARM- basic programming.

UNIT III   PERIPHERALS OF ARM   6
ARM: I/O Memory – EEPROM – I/O Ports – SRAM –Timer –UART - Serial Communication with PC – ADC/DAC Interfacing-stepper motor interfacing

UNIT IV   ARM COMMUNICATION   6
ARM With CAN, I²C, and SPI protocols

UNIT V   INTRODUCTION TO SINGLE BOARD EMBEDDED PROCESSOR   6
Raspberry Pi Architecture - Booting Up RPi- Operating System and Linux Commands -Working with RPi using Python and Sensing Data using Python-programming - GPIO and interfacing peripherals With Raspberry Pi

                                                                       30 PERIODS

LAB COMPONENTS: **30 PERIODS**
1. Laboratory exercise:
    a) Programming with IDE - ARM microcontroller
    b) Advanced Timer Features, PWM Generator.
    c) RTC interfacing with ARM using Serial communication programming, Stepper motor control.
    d) ARM-Based Wireless Environmental Parameter Monitoring System displayed through Mobile device.
2. Seminar:
    a) ARM and GSM/GPS interfacing
    b) Introduction to ARM Cortex Processor
3. Raspberry Pi based Mini project.

                                           TOTAL: 30+30 = 60 PERIODS

COURSE OUTCOMES:
At the end of this course, the students will have the ability to
CO1: Interpret the basics and functionality of processor functional blocks.
CO2: Observe the specialty of RISC processor Architecture.
CO3: Incorporate the I/O hardware interface of processor with peripherals.
CO4: Emphasis the communication features of the processor.
CO5: Improved Employability and entrepreneurship capacity due to knowledge up gradation on
      recent   trends in commercial embedded processors.

TEXTBOOKS:

1. Steve Furber, 'ARM system on chip architecture',Addisonn Wesley,2nd Edition,2015.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield's ARM System Developer's Guide Designing and Optimizing System Software', Elsevier 2004, 1st Edition.

REFERENCES:

1. William Hohl, ' ARMAssebly Language' Fundamentals and Techniques, CRC Press, 2nd Edition 2014.
2. Rajkamal," Microcontrollers Architecture, Programming, Interfacing, & System Design, Pearson,2012, 2nd Edition.
3. ARM Architecture Reference Manual, LPC214x User Manual www.Nuvoton .com/websites on Advanced ARM Cortex Processors
4. ARM System Developer's Guide: Designing and Optimizing System Software 1st Edition (Designing   and Optimizing System Software) Publisher: Morgan Kaufmann Publishers, 2011.

List of Open Source Software/ Learning websites:

1. https://nptel.ac.in/courses/117106111
2. https://onlinecourses.nptel.ac.in/noc20_cs15/preview
3. https://www.csie.ntu.edu.tw/~cyy/courses/assembly/12fall/lectures/handouts/lec08_ARMarch.pdf
4. https://maxembedded.com/2013/07/introduction-to-single-board-computing/
5. https://www.youtube.com/watch?v=J4fhE4Pp55E&list=PLGs0VKk2DiYypuwUUM2wxzcl9BJHK4Bfh

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	2	1	-	-	-	-	-	-	-	2	1	2
CO2	1	1	2	2	1	-	-	-	-	-	-	-	1	2	2
CO3	3	2	3	2	3	-	-	-	-	-	-	-	3	3	3
CO4	3	2	3	2	3	-	-	-	-	-	-	-	2	3	3
CO5	3	2	1	2	1	-	-	-	1	-	-	-	1	2	2
Avg	2.2	1.6	2.2	2	1.8	-	-	-	1	-	-	-	1.8	2.2	2.4

144