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1.3.2

COURSES THAT INCLUDE EXPERIENTIAL LEARNING THROUGH PROJECT WORK/FIELD WORK/ INTERNSHIP DURING 2022-2023

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

S.No	Program Offering	Name of the Course	Course Code	Project/Field Work/Internship	Page No
1	B.E- Electrical and Electronics Engineering	Electric Circuit Analysis	EE3251	Industrial Visit	3
2	B.E- Electrical and Electronics Engineering	Electromagnetic fields	EE3301	In-plant Training	11
3	B.E- Electrical and Electronics Engineering	Digital Logic Circuits	EE3302	In-plant Training	15
4	B.E- Electrical and Electronics Engineering	Electrical Machines -I	EE3303	In-Plant Training	19
5	B.E- Electrical and Electronics Engineering	Transmission and Distribution	EE3401	Industrial Visit	22
6	B.E- Electrical and Electronics Engineering	Linear Integrated Circuits and Applications	EE3402	In-Plant Training	30
7	B.E- Electrical and Electronics Engineering	Measurements and Instrumentation	EE3403	In-Plant Training	34
8	B.E- Electrical and Electronics Engineering	Electrical Machines - II	EE3405	In-Plant Training	38
9	B.E- Electrical and Electronics Engineering	Control Systems	IC8451	Internship	42

10	B.E- Electrical and Electronics Engineering	Power System Analysis	EE8501	Project	45
11	B.E- Electrical and Electronics Engineering	Microprocessors and Microcontrollers	EE8551	Project	51
12	B.E- Electrical and Electronics Engineering	Power Electronics	EE8552	Internship	57
13	B.E- Electrical and Electronics Engineering	Digital Signal Processing	EE8591	Project	60
14	B.E- Electrical and Electronics Engineering	Embedded Systems	EE8691	Project	66
15	B.E- Electrical and Electronics Engineering	Modern Power Converters	EE8004	Internship	72
16	B.E- Electrical and Electronics Engineering	Solid State Drives	EE8601	Project	76
17	B.E- Electrical and Electronics Engineering	Renewable Energy Systems	EE8703	Project	82
18	B.E- Electrical and Electronics Engineering	Power System Operational and Control	EE8702	Internship	88
19	B.E- Electrical and Electronics Engineering	Electronic Devices and Circuits	EC3301	Internship	92
20	B.E- Electrical and Electronics Engineering	Physics for Electrical Engineering	PH3202	Industrial Visit	95

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Principal
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EE3251 ELECTRIC CIRCUIT ANALYSIS

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To introduce electric circuits and its analysis
- To provide key concepts to analyze and understand electrical circuits
- To impart knowledge on solving circuit equations using network theorems
- To educate on obtaining the transient response of circuits.
- To introduce the phenomenon of resonance in coupled circuits.
- To introduce Phasor diagrams and analysis of single &three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 9+3

Fundamentals concepts of R, L and C elements-Energy Sources- Ohm's Law -Kirchhoff 's Laws – DC Circuits – Resistors in series and parallel circuits - A.C Circuits – Average and RMS Value – Complex Impedance – Phasor diagram - Real and Reactive Power, Power Factor, Energy -Mesh current and node voltage methods of analysis D.C and A.C Circuits.

UNIT II NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS 9+3

Network reduction: voltage and current division, source transformation – star delta conversion. Theorems – Superposition, Thevenin's and Norton's Theorem – Maximum power transfer theorem – Reciprocity Theorem – Millman's theorem- Tellegen's Theorem-Statement, application to DC and AC Circuits.

UNIT III TRANSIENT RESPONSE ANALYSIS 9+3

Introduction – Laplace transforms and inverse Laplace transforms- standard test signals -Transient response of RL, RC and RLC circuits using Laplace transform for Source free, Step input and Sinusoidal input.

UNIT IV RESONANCE AND COUPLED CIRCUITS 9+3

Series and parallel resonance –frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling – Dot rule-Analysis of coupled circuits– Single Tuned circuits.

UNIT V THREE PHASE CIRCUITS 9+3

Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced – phasor diagram of voltages and currents – power measurement in three phase circuits– Power Factor Calculations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Explain circuit's behavior using circuit laws.
CO2: Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit
CO3: Compute the transient response of first order and second order systems to step and sinusoidal input
CO4: Compute power, line/ phase voltage and currents of the given three phase circuit
CO5: Explain the frequency response of series and parallel RLC circuits
CO6: Explain the behavior of magnetically coupled circuits.

TEXT BOOKS:

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis”, McGraw Hill publishers, 9th edition, New Delhi, 2020.
2. Charles K. Alexander, Mathew N.O. Sadiku, “Fundamentals of Electric Circuits”, Second Edition, McGraw Hill, 2019.
3. Allan H. Robbins, Wilhelm C. Miller, “Circuit Analysis Theory and Practice”, Cengage Learning India, 2013.

REFERENCES:

1. Chakrabarti A, “Circuits Theory (Analysis and synthesis), Dhanpat Rai& Sons, New Delhi,2020.
2 Joseph A. Edminister, Mahmood Nahvi, “Electric circuits”, Schaum’s series, McGraw-Hill,First Edition, 2019.
4. M E Van Valkenburg, “Network Analysis”,Prentice-Hall of India Pvt Ltd, New Delhi, 2015.
5. Richard C. Dorf and James A. Svoboda, “Introduction to Electric Circuits”, 7th Edition, JohnWiley Sons, Inc. 2018.
6. Sudhakar A and Shyam Mohan SP, “Circuits and Networks Analysis and Synthesis”, McGraHill, 2015.

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Reach the Star
NAAC

Industrial Visit to VEI Technologies, Chennai

PERMISSION LETTER

From

Dr. P.S. Satheesh Kumar,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology,Natham,
Dindigul – 624 401.

To

The Administrative Office,
NPR Group of Institutions,
Natham,
Dindigul – 624 401.

Through Proper Channel

Sub: Requesting permission for Industrial visit – Reg.

Respected Sir,

I am writing to formally request permission for an industrial visit to VEI Technologies for our 1st Year students. The visit is scheduled to take place on two days, as outlined below:

I Batch - Departments: CSE A, CSE B, and EEE on 20.06.2023

II Batch - Departments: ECE, AI & DS, MECH and IT on 21.06.2023

We are planning for a total of 270 students from the 1st Year, consisting of 180 boys and 90 girls, accompanied by 6 staff members. The staff members accompanying the students are Dr. P.S. Satheesh Kumar, Prof/Physics, Dr. N. Kavitha, ASP/Physics, Dr. P. Rani, ASP/Maths, Dr. P. Shanmuga Priya, ASP/English, Dr. N. Prabakaran, ASP/Chemistry and Mrs. C. Yogitha, AP/Maths.

We assure you that all necessary arrangements regarding transportation, supervision, and safety measures will be diligently taken care of throughout the visit.

We kindly request your approval for this industrial visit, as it will significantly contribute to the academic and professional development of our students.We eagerly await your favorable response.

Yours Faithfully,

(Dr. P. S. Satheesh Kumar)

Natham,
12.06.2023

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul Dist.

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NAAC

Industrial Visit to VEI Technologies, Chennai

REQUISITION LETTER

From,
Dr. P.S. Satheesh Kumar,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology, Natham,
Dindigul – 624 401.

To,
Dr B Ezhilavan,
Managing Director,
VEI Technologies,
Chennai.

Dear Sir,
Greetings!
I hope this letter finds you in good health and high spirits. I am writing on behalf of NPR College of Engineering and Technology, situated in Natham, Dindigul district. Our institution is dedicated to the personal and professional development of students from rural backgrounds, offering a range of UG and PG courses.

It has been a longstanding practice in our Science and Humanities Department to organize industrial visits for our students every semester, aiming to provide them with practical exposure and industry insights. In line with this, we have planned an industrial visit to VEI Technologies for our 270 first year students and 6 accompanying staff members. The visit is scheduled for two days, with two batches visiting on 20/6/23 and 21/6/23, respectively.
We assure you, sir, that our students will adhere strictly to safety protocols and will not disrupt your regular operations during their visit.

We humbly request your esteemed organization to grant us permission for this industrial visit. We would greatly appreciate if you could confirm the permission through a formal letter or email correspondence.

We look forward to the opportunity for our students to benefit from this valuable learning experience at VEI Technologies.

Natham,
12.06.23

Yours faithfully,
(Dr. P. S. Satheesh Kumar)

NPR COLLEGE OF ENGG. & TECHNOLOGY * NATHAM

Industrial Visit to VEI Technologies, Chennai

CONFIRMATION LETTER FROM INDUSTRY

Gmail

Inbox

info@veitechnologies.com Wed, JUNE 14,2023, 12.28 PM

To:

hodmathematicsnprcet@gmail.com

Dear Sir,

We are happy to give permission for the industrial visit to your wards in VEI Technologies, Chennai. Kindly remind us one day in advance for the visit schedule also send the original letter copy with your hand during the visit.

Thanks and Regards,

Dr B Ezhilavan,
Managing Director,
VEI Technologies,
Chennai.

DEPARTMENT OF SCIENCE AND HUMANITIES Industrial Visit to VEI Technologies,Chennai				
S.No.	REGISTER NUMBER	NAME OF THE STUDENT	DEPARTMENT	GENDER
113	920822104114	Veera Ramana M	CSE- B	Male
114	920822104115	Vibin Dipak K	CSE- B	Male
115	920822104116	Vignesh M	CSE- B	Male
116	920822104117	Vignesh R	CSE- B	Male
117	920822104118	Vijayalakshmi A	CSE- B	Female
118	920822104119	Vijayan S	CSE- B	Male
119	920822104120	Vimal Sanjay A	CSE- B	Male
120	920822104121	Visali S	CSE- B	Female
121	920822104122	Vishnupriya D	CSE- B	Female
122	920822104123	Viswa B	CSE- B	Male
123	920822104124	Yagavarman S	CSE- B	Male
124	920822104125	Yoganth M	CSE- B	Male
125	920822104126	Yohith Kumar Nagarajan	CSE- B	Male
126	920822105001	Abhin Krishna U V	EEE	Male
127	920822105002	Abirami P	EEE	Female
128	920822105003	Ajay S	EEE	Male
129	920822105004	Ariyadharshini B	EEE	Female
130	920822105005	Atheeswaran M	EEE	Male
131	920822105006	Chellan P	EEE	Male
132	920822105007	Deenadhayalan T	EEE	Male
133	920822105008	Dhanushkumar K	EEE	Male
134	920822105009	Dharani M	EEE	Female
135	920822105010	Dharani Daran M	EEE	Male
136	920822105011	Dhinesh Prasad S	EEE	Male
137	920822105012	Eswara Pandi R	EEE	Male
138	920822105013	Hari Haran G	EEE	Male
139	920822105014	Harini R	EEE	Female
140	920822105015	Kaja Mohaideen S	EEE	Male
141	920822105016	Karuppaiah C	EEE	Male
142	920822105017	Mohammed Hanif H	EEE	Male
143	920822105018	Nikeelash Bala M	EEE	Male
144	920822105019	Pandi Manikandan N	EEE	Male
145	920822105020	Premkumar K	EEE	Male
146	920822105021	Raghul Kanna S	EEE	Male
147	920822105022	Rajapandian R	EEE	Male
148	920822105023	Sakthi Vignesh S	EEE	Male

HOD-I Year
(Dr. P.S. Satheesh Kumar)

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
PRINCIPAL
NPR College of Engineering & Technology

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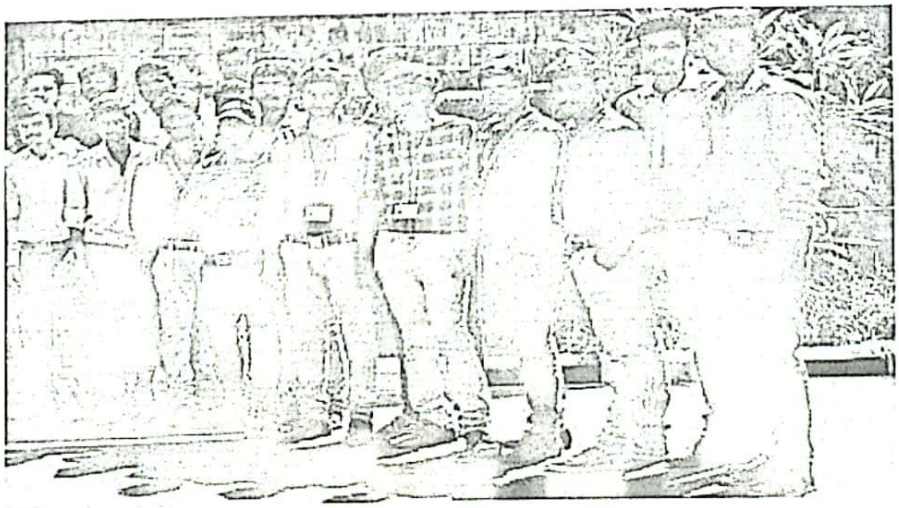
DEPARTMENT OF SCIENCE AND HUMANITIES

Industrial Visit to VEI Technologies, Chennai

PHOTO GALLERY

Date:20/6/23 & Date: 21/6/23



I Year students are standing in front of VEI Technologies

DEPARTMENT OF SCIENCE AND HUMANITIES

Industrial Visit to VEI Technologies, Chennai

Summary Report

Date: June 20th, 2023 (I Batch) and June 21st, 2023 (II Batch)
Venue: VEI Technologies, Poonamallee, Chennai

Purpose: The industrial visit to VEI Technologies aimed to offer students from NPRCET a practical insight into industry operations and various departments. It provided an opportunity for 270 first-year students (90 girls and 180 boys) in two batches, accompanied by six staff members, to gain valuable knowledge about the functioning of an R&D company specializing in web development and software solutions.

Schedule:

- **Departure:** Students were picked up from NPRCET on 20.6.23(I Batch) and on 21.6.23(II Batch) at 9:30 pm and traveled by bus to Chennai.
- **Arrival:** The group reached Chennai at 6:00 am the following day.
- **Visit to VEI Technologies:** From 9:00 am to 12:00 pm, students toured the facility, gaining insights into the company's various departments and operations.
- **Meeting with Director:** Students had the opportunity to meet Mr. Babu Ezhilavan, the Director of VEI Technologies, who provided information about the company's services, including web application development, website designing, e-commerce solutions, and more. They also learned about value-added courses offered by the company in areas such as IoT, Java and Python.
- **Leisure Activities:** After lunch at a nearby restaurant from 12:00 p.m to 1:00 p.m, students visited the planetarium from 1:00 p.m to 3:00 p.m, followed by a visit to the zoo from 3:00 p.m to 5:00 p.m, and a trip to the beach from 5:00 p.m to 6:30 p.m.
- **Return:** The students began their return journey at 8:00 p.m and reached NPRCET on 20.6.23(I Batch) and on 21.6.23(II Batch) at 5:00 a.m the next day.

Outcome: The industrial visit provided students with a practical understanding of industry operations and exposed them to various aspects of web development and software solutions. The interaction with staff and the Director of VEI Technologies enhanced the students' knowledge about the industry and its potential career paths. Additionally, the inclusion of leisure activities ensured a well-rounded experience for the students.

Conclusion: The visit to VEI Technologies was a valuable learning experience for the students, allowing them to bridge the gap between theoretical knowledge and practical application in the industry. The well-organized itinerary balanced educational insights with recreational activities, making it a memorable and enriching trip for all participants.

On completion of this industrial visit, the following Pos and PSOs were enabled.

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
√				√		√		√	√	√	√			

FACULTY CO-ORDINATORS
(Dr. P. Rani, ASP/Maths)

HOD
Dr. P S Satheesh Kumar

IQAC

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
PRINCIPAL
Principal
NPR College of Engineering & Technology

EE3301	ELECTROMAGNETIC FIELDS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of
  - Electrostatic fields, electrical potential, energy density and their applications.
  - Magneto static fields, magnetic flux density, vector potential and its applications.
  - Different methods of emf generation and Maxwell's equations
  - Electromagnetic waves and characterizing parameters

UNIT I ELECTROSTATICS– I **6+6**

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields –Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field dueto discrete and continuous charges – Gauss's law and applications.

UNIT II ELECTROSTATICS– II **6+6**

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilizationfactor – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS **6+6**

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundaryconditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV ELECTRODYNAMICFIELDS **6+6**

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory
– Applications.

UNIT V ELECTROMAGNETICWAVES **6+6**

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth
- Poynting vector – Plane wave reflection and refraction.

TOTAL : 60 PERIODS

OUTCOMES:

- Ability to understand the basic mathematical concepts related to electromagnetic vectorfields.
- Ability to understand the basic concepts about electrostatic fields, electrical potential,energy density and their applications.
- Ability to acquire the knowledge in magneto static fields, magnetic flux density, vectorpotential and its applications.
- Ability to understand the different methods of emf generation and Maxwell's equations
- Ability to understand the basic concepts electromagnetic waves and characterizingparameters
- Ability to understand and compute Electromagnetic fields and apply them for design andanalysis of electrical equipment and systems

TEXT BOOKS:

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford UniversityPress Inc. Asian edition,2015.
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill SpecialIndian edition, 2014.
3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill InternationalEditions, Fifth Edition,2010.

REFERENCES

1. V.V.Sarwate, 'Electromagnetic fields and waves', First Edition, Newage Publishers,1993.
2. J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications',Second Edition, KhannaPublishers.
3. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum'sOutline Series), McGraw Hill,2010.
4. S.P.Ghosh, LipikaDatta, 'Electromagnetic Field Theory', FirstEdition,McGraw HillEducation(India) Private Limited,2012.
5. K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Eighth Reprint:2015

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Labo Scientific
563, 7th Cross Main Road, Srinivasa Nagar, Trichy -620017.
laboscientificindia@gmail.com, 8667767992.

labo scientific Engineering

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that NARESH KARTHIK M S of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking.

With Regards

For LABO - SCIENTIFIC

Proprietor

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

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Labo Scientific
563, 7th Cross Main Road, Srinivasa Nagar, Trichy -620017.
laboscientificindia@gmail.com, 8667767992.

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that MOHAMED THOUFEEK S of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking.

With Regards

For LABO - SCIENTIFIC

Proprietor

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Tech...
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EE3302	DIGITAL LOGIC CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamentals of combinational and sequential digital circuits.
- To study various number systems and to simplify the mathematical expressions using Boolean functions word problems
- To study implementation of combinational circuits using Gates` and MSI Devices.
- To study the design of various synchronous and asynchronous circuits
- To introduce digital simulation techniques for development of application oriented logic circuit

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES **9**

Number system, error detection, corrections & codes conversions, Boolean algebra: De-Morgan's theorem, switching functions and minimization using K-maps & Quine McCluskey method - Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families - operation, characteristics of digital logic family

UNIT II COMBINATIONAL CIRCUITS **9**

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS **9**

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters -asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Mealy models- Counters, state diagram; statereduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES **9**

Asynchronous sequential logic circuits-Transition stability, flow stability-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmability Logic Devices: PROM – PLA –PAL,CPLD-FPGA.

UNIT V VHDL **9**

RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & Demultiplexers).

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to explain various number systems and characteristics of digital logic families.
- Ability to apply K-maps and Quine McCluskey methods to simplify the given Boolean expressions
- Ability to explain the implementation of combinational circuit such as multiplexers and demultiplexers - code converters, adders, subtractors, Encoders and Decoders
- Ability to design various synchronous and asynchronous circuits using flipflops.
- Ability to explain asynchronous sequential circuits and PLDs
- Ability to use VHDL for simulating and testing RTL, combinatorial and sequential circuits

TEXT BOOKS:

1. Morris Mano.M, 'Digital Logic and Computer Design', Prentice Hall of India, 3rdEdition, 2005.
2. Donald D.Givone, 'Digital Principles and Design', Tata McGraw Hill,1st Edition, 2003
3. Thomas L Floyd, 'Digital fundamentals', Pearson Education Limited, 11th Edition, 2018

REFERENCES:

1. Tocci R.J., Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 12th Edition, 2017.
2. Donald P Leach, Albert Paul Malvino, Goutam Sha, 'Digital Principles and Applications', Tata McGraw Hill, 7th Edition, 2010.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

Caliber

CALIBER VIRTUAL TECHNOLOGIES
NO:4, I st FLOOR, GANDHI NAGAR FIRST STRLET, GST. No: 33BYOPP5323C3ZH
KAVUNDAPALAYAM, COIMBATORE— 641030.

Date: 25.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that RAMYA M of second year EEE of NPR College of Engineering & Technology, Natham has successfully done the In-Plant training in our concern from 14.09.2022 to 25.09.2022.

During this period her conduct was sincere and hardworking.

AUTHORISED SIGNATURE

N.P.R. COLLEGE OF ENGG. & TECH. * NATHAM-624 401 *

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401

salemcaliberembeddedtech@gmail.com

Caliber

CALIBER VIRTUAL TECHNOLOGIES
NO:4, I st FLOOR, GANDHI NAGAR FIRST STRLET, GST. No: 33BYOPP5323C3ZH
KAVUNDAPALAYAM, COIMBATORE— 641030.

Date: 25.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that SANTHOSH A of second year EEE of NPR College of Engineering & Technology, Natham has successfully done the In-Plant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking.

AUTHORISED SIGNATURE

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

N.P.R. COLLEGE OF ENGG & TECH. NATHAM-624 401

salemcaliberembeddedtech@gmail.com

EE3303 ELECTRICAL MACHINES – I L T P C

3 0 0 3

OBJECTIVES:

- To understand the concept of electromechanical energy conversion system.
- To identify the appropriate machine for a given application based on its characteristics.
- To identify the appropriate test to determine the performance parameters of a given machine.
- To familiarize with the procedure for parallel operation of generators and transformers.
- To deliberate the working of auto transformer and three phase transformers.

UNIT I ELECTROMECHANICAL ENERGY CONVERSION 9

Fundamentals of Magnetic circuits- Statically and dynamically induced EMF - Principle of electro mechanical energy conversion forces and torque in magnetic field systems - energy balance in magnetic circuits - magnetic force - co-energy in singly excited and multi excited magnetic field system mmf of distributed windings – Winding Inductances - magnetic fields in rotating machines- magnetic saturation and leakage fluxes. Introduction to Indian Standard Specifications (ISS) - Role and significance in testing.

UNIT II DC GENERATORS 9

Principle of operation, constructional details, armature windings and its types, EMF equation, wave shape of induced emf, armature reaction, demagnetizing and cross magnetizing Ampere turns, compensating winding, commutation, methods of improving commutation, interpoles, OCC and load characteristics of different types of DC Generators. Parallel operation of DC Generators, equalizing connections- applications of DC Generators.

UNIT III DC MOTORS 9

Principle of operation, significance of back emf, torque equations and power developed by armature, speed control of DC motors, starting methods of DC motors, load characteristics of DC motors, losses and efficiency in DC machine, condition for maximum efficiency. Testing of DC Machines: Brake test, Swinburne's test, Hopkinson's test, Field test, Retardation test, Separation of core losses-applications of DC motors.

UNIT IV SINGLE PHASE TRANSFORMER 9

Construction and principle of operation, equivalent circuit, phasor diagrams, testing - polarity test, open circuit and short circuit tests, voltage regulation, losses and efficiency, all day efficiency, back-to back test, separation of core losses, parallel operation of single-phase transformers, applications of single-phase transformer.

UNIT V AUTOTRANSFORMER AND THREE PHASE TRANSFORMER 9

Construction and working of auto transformer, comparison with two winding transformers, applications of autotransformer. Three Phase Transformer- Construction, types of connections and their comparative features, Scott connection, applications of Scott connection.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to analyze the magnetic-circuits.
- Ability to understand the concepts of electromechanical energy conversion.
- Ability to acquire the knowledge in working principles of DC Generator.
- Ability to acquire the knowledge in working principles of DC Motor
- Ability to acquire the knowledge in various losses taking place in D.C.Machines
- Ability to draw the equivalent circuit of transformer and predetermine the efficiency and regulation.
- Ability to Describe the working principle of auto transformer, three phase transformer with different types of connections.

TEXT BOOKS:

1. I. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 5th Edition, 2017.

2. P. S. Bimbhra, “Electric Machinery”, Khanna Publishers, 2nd Edition, 2021.

REFERENCES

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 6th Edition 2017.

2. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2018.

3. M. G. Say, “Performance and design of AC machines”, CBS Publishers, First Edition 2008.

4. Sahdev S. K. “Electrical Machines”, Cambridge University Press, 2018.

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563, 7th Cross Main Road, Srinivasa Nagar, Trichy -620017.
laboscientifichdia@gmail.com, 8667767992.

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that NANDHA KUMAR M of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking.

With Regards

For LABO - SCIENTIFIC

Proprietor

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D..
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N.P.R. COLLEGE OF ENGG & TECH. NATHAM

EE3401 TRANSMISSION AND DISTRIBUTION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge about the configuration of the electrical power systems.
- To study the line parameters and interference with neighboring circuits.
- To understand the mechanical design and performance analysis of transmission lines.
- To learn about different insulators and underground cables.
- To understand and analyze the distribution system.

UNIT I TRANSMISSION LINE PARAMETERS **9**

Structure of electric 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 - Typical configuration, conductor types - Symmetrical and unsymmetrical spacing and transposition – application of self and mutual GMD; skin and proximity effects - Effects of earth on the capacitance of the transmission line - interference with neighboring communication circuits.

UNIT II MODELLING AND PERFORMANCE OFTRANSMISSION 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 – Ferranti effect – Formation of Corona – Critical Voltages – Effect on line Performance.

UNIT III SAG CALCULATION AND LINE SUPPORTS **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 GROUNDCABLES **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 structure of power system, computation of transmission line parameters for different configurations.
- To Model the transmission lines to determine the line performance and to understand the impact of Ferranti effect and corona on line performance.
- To Mechanical design of transmission lines, grounding and to understand about the insulators in transmission system.
- To Design the underground cables and understand the performance analysis of underground cable.
- To Understand the modelling, performance analysis and modern trends in distribution system.

TEXT BOOKS:

1. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', McGraw-Hill Publishing Company limited, New Delhi, Third Edition,2019.
2. C.L.Wadhwa, 'Electrical Power Systems', New Age International Ltd, Seventh Edition 2022.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hallof India Pvt. Ltd, New Delhi, Second Edition, 2008.

REFERENCES

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Sixth Edition, 2011.
2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education,2007.
3. Arun Ingole, "power transmission and distribution" Pearson Education, First Edition 2018
4. J.Brian Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition,2011.
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
7. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 3rd Edition, 23rd reprint, 2015.

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NPR

College of Engineering & Technology

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REQUEST LETTER TO COMPANY

NPR COLLEGE OF ENGINEERING & TECHNOLOGY
(Approved by AICTE, New Delhi & Affiliated to Anna University, CHENNAI)
NPR Nagar, Natham, Dindigul - 624 401. Tamilnadu
Ph: 04544 - 246500, 501, 502
Website: www.nprcet.org, www.nprcolleges.org E-mail: nprgi@nprcolleges.org

Ref: NPRCET/

OFF/EEE/IV/2022-23 Date : 02.09.2022

To

The Superintending Engineer/Operation,

Madurai.

Respected sir,

Subject: Seeking permission for one day Industrial visit to Samayanallur Substation -Reg.

NPR College of Engineering & Technology, Natham, which is 27 kms away from Dindigul and 35 kms away from Madurai, Tamil Nadu. We are pleased to introduce ourselves as one of the premier college in the field of education. Our college recognizes the growing necessity to prepare the students from the rural and semi-urban sectors of India to be employable.

Hereby I am looking for permission to Visit the Samayanallur substation, Samayanallur for the purpose of Industrial visit on 27.09.2022. The visit will be useful for Final year (15 students) & Third year (36 students) to have a good practical knowledge about Power system, Transmission & Distribution.

So Kindly grant permission for 51 students and 3 staff members on 27.09.2022 to visit the Samayanallur substation.

Place : Natham

Date: 02/09/2022

PRINCIPAL
Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

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CONFORMATION LETTER FROM COMPANY

TANTRANSCO LTD

Office of the Superintending Engineer,
Operation/Madurai-04.

MemoNo.SE/O/MDU/EA/JA/F.Indl.Visit/D.No: 17,17/22,dt. 17 .09.2022

Sub: Visit to Samayanallur 230KV Substation by the students of NPR College of Engineering & Technology, Natham,Dindigul - Permission granted -Regarding.

Ref: 1)Vigilance cell Circular MemoNO.3987/B11/B112/2015-1, Dated:26.03.2015.
2) Vigilance cell Circular Memoranduk (per)NO./ B11/B112/2019-1,Dated :29.08.2019
3)Secretariat Branch (Per.)CMD TANGRDCO Proceedins No.102 Datd 10thJune 2020
4)Technical Branch (Per.)CMD TANGEDCO Proceedins No.126 Datd 07.06.2022
5) From the Principal, NPR College of Engineering & Technology Lr.dt:02.09.2022

****

Two batches of 51 Students (15 Students-Final year 36students- Third year of B.E Electrical and Electronic Engineering and 3 staff members (30 No's per batch) along with faculty members in each session of NPR College of Engineering & Technology are permitted to visit 230KV Samayanallur Substation on 27.09.2022(i.eForenoon & Afternoon) Subject to the conditions specified in the memo first cited.

The individuals should given an undertaking as in annexure –C and abide by the terms and conditions stipulated by the Board during the period of Industrial Visit. Each student should pay the fees of Rs.100/- (Registration fee Rs.85/- +GST 18% Rs.15) by the mode of Demand Draft in favour of Superintending Engineer/ Operation/ TANTRANSCO/ Madurai to undergo the industrial visit at TANTRANSCO LIMITED

17.9.22
Superintending Engineer, I/c
Operation/Madurai.

To,
The Executive Engineer/Operation/ Samayanallur
Encl:Annexure-1
(He is requested to obtain ready list from the college concerned containing the name age and address of the visitors during the visit)

Copy to
The Principal NPR College of Engineering & Technology, Natham,Dindigul -624 401.

Encl: Annexure-1
(He is informed that a Maximum numbers of 60 students will be permitted per day (i.e.Fornoon & Afternoon) for industrial visit and he is requested to prepare ready list regarding name age address etc., of the students and hand over the same to the office at the place of visit.)

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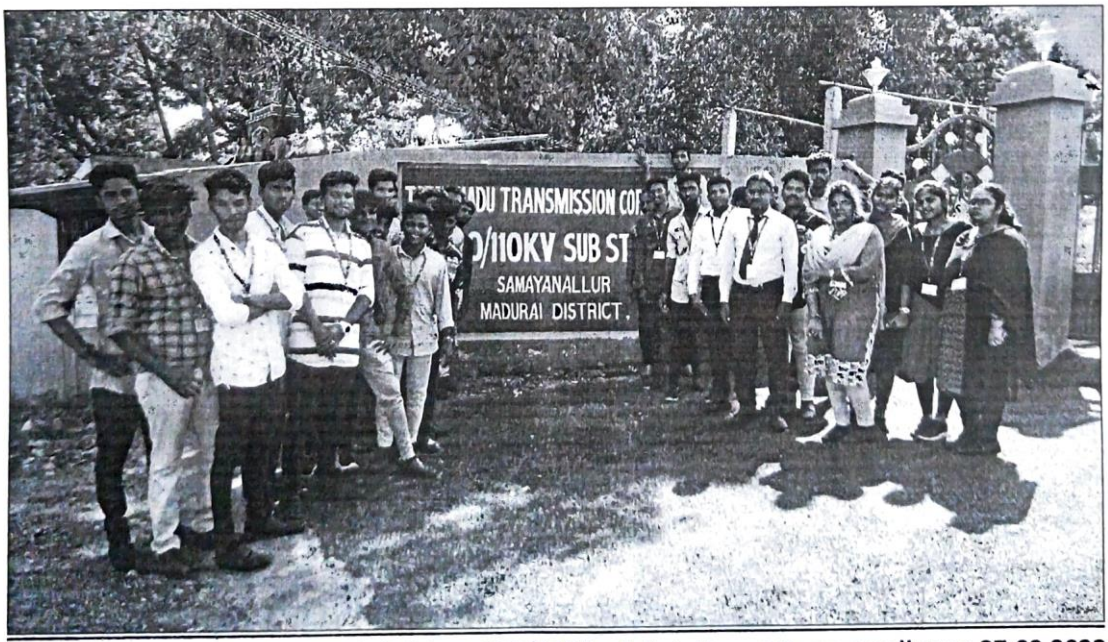
PHOTO GALLARY

IV Year students – Industrial Visit at 230/110 kv Substation at Samayanallur on 27.09.2022



III Year students – Industrial Visit at 230/110 kv Substation at Samayanallur on 27.09.2022

Industrial Visit

Report

Ministry of Education
Government of India

MoE's INNOVATION CELL
(GOVERNMENT OF INDIA)

INSTITUTION'S INNOVATION COUNCIL

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STUDENT'S NAME LIST
INDUSTRIAL VISIT
III YEAR EEE

S.NO	REG NO	NAME OF THE STUDENT
1.	920820105001	BASKAR A
2.	920820105002	BHARATHIRAJA C
3.	920820105003	GOVINRHAVASAN A
4.	920820105004	HARISH G
5.	920820105005	ISHAS AHAMED A
6.	920820105007	JEYARAM M
7.	920820105008	JUSTIN THIRAVIYAM A
8.	920820105009	KABIL SHARMA M
9.	920820105010	LOGESH KUMAR M
10.	920820105011	MAHENDRA S
11.	920820105012	MOHAMMED ASHIK S
12.	920820105013	RAMAR V
13.	920820105014	SARAVANA KUMAR S
14.	920820105015	SARAVANA MUTHU K
15.	920820105016	SARWESH R
16.	920820105017	THARUN N
17.	920820105018	THAVAMANI A
18.	920820105019	VENKATESH V
19.	920820105302	BHARATHA RAJA S
20.	920820105303	BRINTHA R
21.	920820105304	GANESH S
22.	920820105305	GEETHANJALI DEVI S
23.	920820105306	HAREESH K.S
24.	920820105307	KALAI SELVI S
25.	920820105308	KRISHNA PANDIAN S
26.	920820105309	LAKSHMANAN T
27.	920820105310	LOGANATHAN M
28.	920820105311	MOHAMMED HARISH H
29.	920820105312	MONIKA K
30.	920820105313	POOVARASAN R
31.	920820105314	PRAVEEN KUMAR R
32.	920820105315	REEGAN S
33.	920820105317	SHYLESH KUMAR V
34.	920820105318	SIVA S

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STUDENT'S NAME LIST
INDUSTRIAL VISIT
IV YEAR EEE

S.NO	REG NO	NAME OF THE STUDENT
1	920819105001	A AHAMED AFZAR
2	920819105002	K ARAVIND KUMAR
3	920819105003	A GURU PRASATH
4	920819105004	R KARTHIKEYAN
5	920819105005	M KASTHURI
6	920819105006	A LAKSHMI PRIYA
7	920819105007	N LOGESH WARAN
8	920819105009	D PITCHIYATHA
9	920819105010	V POORNA KUMAR
10	920819105011	B PRADAP KANNAN
11	920819105012	M RAJA MURUGAN
12	920819105013	M RAJA SEKAR
13	920819105014	S SUJEETHRAN
14	920819105015	C USHA DEVI
15	920819105016	M VIGNESH

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SUMMARY REPORT

Our 49 students and 04 faculty members of Electrical and Electronics Engineering department started our journey to the industrial visit from NPRCET at 10.00 a.m. At 11. 15 a.m., we reached Samayanallur substation. We segregated 2 batches and separately visited the substation as per the guidance of Executive Engineer of substation. After completed our visit, we finished our lunch. We started our journey to NPRCET then reached at 3.50 p.m.

The students visited the 230 kv transmission line from different place as input to substation and 110 kv as output to customers during the visit and also visited the substation and the unit like input line, busbar, feeders, breaker point, transformer and output line. The students asked question and got the valuable answers from the Executive Engineer. Overall, transmission and distribution system, Power system analysis, and operation control systems are learned by the students during this visit.

OUTCOME:

Students are learned about SCADA system with live monitoring from the substation.

COORDINATOR

HOD/ EEE

IQAC COORDINATOR

PRINCIPAL

Coordinator - IQAC
NPR College of Engineering & Technology
Natham, Dindigul (Dt)-624 401

Principal
NPR College of Engineering & Technology
Natham, Dindigul (Dt)-624 401

Industrial Visit

Report

Ministry of Education
Government of India

MoE's INNOVATION CELL
(GOVERNMENT OF INDIA)

INSTITUTION'S INNOVATION COUNCIL

EE3402 LINEAR INTEGRATED CIRCUITS

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, regulatorCircuits.
- 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-invertingAmplifiers, 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 OP-AMPs.

UNITIV SPECIAL ICs **9**

Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltagecontrolled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs.

UNITV APPLICATION ICs **9**

AD623 Instrumentation Amplifier and its application as load cell weight measurement - IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variability voltage regulators, switching regulator- SMPS - ICL 8038 function generator IC.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to acquire knowledge in IC fabrication procedure
- Ability to analyze the characteristics of Op-Amp
- To understand the importance of Signal analysis using Op-amp based circuits.
- Functional blocks and the applications of special ICs like Timers, PLL circuits,regulator Circuits.
- To understand and acquire knowledge on the Applications of Op-amp
- Ability to understand and analyse, linear integrated circuits their Fabrication andApplication.

TEXT BOOKS:

1. David A. Bell, 'Op-amp & Linear ICs', Oxford, Third Edition 2011.
2. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', Fourth edition,New Age, 2018.
3. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI.2021.

REFERENCES

1. Fiore,"Opamps& Linear Integrated Circuits Concepts & applications", Cengage, 2010.
2. Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson,2013.
3. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', McGraw Hill, 2nd Edition 2017.
4. Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', Pearson, 6th edition,2012.
5. Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', Mc Graw Hill,2016 – Fourth Edition.
6. Muhammad H. Rashid,' Microelectronic Circuits Analysis and Design' Cengage Learning, 2nd Edition 2012.

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Trichy – 620102.
corporate.umbrella1998@gmail.com
8015080200.

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that LAARA DOLLY S of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period her conduct was sincere and hardworking.

With Regards

For UMBRELLA CORPORATION

Proprietor

UMBRELLA CORPORATION TRICHY-102

Dr. J.SUNDARARAJAN,
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N.P.R. COLLEGE OF ENGG & TECH NATHAM

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8015080200.

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that LOGESH S of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking.

With Regards

For UMBRELLA CORPORATION

Proprietor

UMBRELLA CORPORATION TRICHY-102

Dr. J.SUNDARARAJAN.
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N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

EE3403 MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To educate the fundamental concepts and characteristics of measurement and errors
- To impart the knowledge on the functional aspects of measuring instruments
- To infer the importance of various bridge circuits used with measuring instruments.
- To educate the fundamental working of sensors and transducers and their applications
- To summarize the overall measurement and instrumentation with the knowledge on digital instrumentation principles.

UNIT I CONCEPTS OF MEASUREMENTS 9

Instruments: classification, applications – Elements of a generalized measurement system - Static and dynamic characteristics - Errors in measurement -Statistical evaluation of measurement data.

UNIT II MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS 9

Classification of instruments – moving coil and moving iron meters – Induction type, dynamometer type watt meters – Energy meter – Megger – Instrument transformers (CT & PT).

UNIT III AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS 9

Wheatstone bridge, Kelvin double bridge - Maxwell, Hay, Wien and Schering bridges – Errors and compensation in A.C. bridges - Instrumentation Amplifiers.

UNIT IV TRANSDUCERS FOR MEASUREMENT OF NON- ELECTRICAL PARAMETERS 9

Classification of transducers – Measurement of pressure, temperature, displacement, flow, angular velocity – Digital transducers – Smart Sensors.

UNIT V DIGITAL INSTRUMENTATION 9

A/D converters: types and characteristics – Sampling, Errors- Measurement of voltage, Current, frequency and phase - D/A converters: types and characteristics- DSO- Data Loggers – Basics of PLC programming and Introduction to Virtual Instrumentation - Instrument standards.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to understand the fundamental art of measurement in engineering.
- Ability to understand the structural elements of various instruments.
- Ability to understand the importance of bridge circuits.
- Ability to understand about various transducers and their characteristics by experiments.
- Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.

TEXT BOOKS:

1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements &Instrumentation',Dhanpat Rai and Co, New Delhi, Edition 2011.
2. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

REFERENCES

2. M.M.S. Anand, 'Electronics Instruments and Instrumentation Technology', Prentice Hall India, New Delhi, 2009
3. J.J. Carr, 'Elements of Electronic Instrumentation and Measurement', Pearson Education India, New Delhi, 2011
4. W.Bolton, Programmable Logic Controllers, 6th Edition, Elseiver, 2015.
5. R.B. Northrop, 'Introduction to Instrumentation and Measurements', Taylor & Francis, New Delhi, 3rd Edition 2014.
6. E. O. Doebelin and D. N. Manik, "Measurement Systems – Application and Design", Tata McGraw-Hill, New Delhi, 6th Edition 2017.
7. R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016

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8015080200.

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that KEERTHIKA P of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period her conduct was sincere and hardworking.

With Regards

For UMBRELLA CORPORATION

Proprietor

UMBRELLA CORPORATION TRICHY-102

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Tech...
Natham, Dindigul(Dt) - 624 401.

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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Trichy – 620102.
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8015080200.

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that LOGESWARAN S of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking.

With Regards

For UMBRELLA CORPORATION

Proprietor

UMBRELLA CORPORATION TRICHY-102

Dr. J.SUNDARARAJAN,
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Principal
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Natham, Dindigul (Dt) - 624 401.

N.P.R. COLLEGE OF ENGG. & TECH NATHAM-624 401

EE3405 ELECTRICAL MACHINES - II **LT P C**
3 0 0 3

COURSE OBJECTIVES:

To impart knowledge on the following Topics

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

UNIT I SYNCHRONOUS GENERATOR **9**

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

UNIT II SYNCHRONOUS MOTOR **9**

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

UNIT III THREE PHASE INDUCTION MOTOR **9**

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

UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR **9**

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

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES **9**

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon the successful completion of the course, students will have the:
CO1: Ability to understand the construction and working principle of Synchronous generator
CO2: Ability to understand the construction and working principle of Synchronous Motor
CO3: Ability to understand the construction and working principle of Three Phase Induction Motor
CO4: Acquire knowledge about the starting and speed control of induction motors.
CO5: To gain knowledge about the basic principles and working of Single phase induction motors and Special Electrical Machines.

TEXT BOOKS:

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc Graw Hill publishing Company Ltd, 6th Education 2017.
2. Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 4th Edition 2017.
3. D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 5th Edition 2017
4. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, edition 2, 2021.

REFERENCES:

1. Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.
2. M.N. Bandyo padhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2011.
3. B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition, Reprint 2015.
4. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, First edition 2010.
5. Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', McGraw Hill Publications, 2001.

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Date: 25.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that ANBARASAN P of second year EEE of NPR College of Engineering & Technology, Natham has successfully done the In-Plant training in our concern from 14.09.2022 to 25.09.2022.

During this period their conduct was sincere and hardworking.

sundaresh kamaraj

Sundaresh Kamaraj,
Founder & CEO

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ELYSIUM GROUPS

Date: 25.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that ASHOK VISHWANATH M of second year EEE of NPR College of Engineering & Technology, Natham has successfully done the In-Plant training in our concern from 14.09.2022 to 25.09.2022.

During this period their conduct was sincere and hardworking.

sundaresh kamaraj

Sundaresh Kamaraj,
Founder & CEO

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IC8451 CONTROL SYSTEMS **L T P C**
3 2 0 4

COURSE OBJECTIVES

- To understand the use of transfer function models for analysis physical systems and introduce the control system components.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To introduce stability analysis and design of compensators

UNIT I SYSTEMS AND REPRESENTATION **9**

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanicaland thermal systems – Transfer function – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE **9**

Time response: – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – Root locus construction- Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT III FREQUENCY RESPONSE **9**

Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domainspecifications

UNIT IV STABILITY ANDCOMPENSATOR DESIGN **9**

Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria – Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag-leadcompensator using bode plots.

UNIT V STATE VARIABLE ANALYSIS **9**

Concept of state variables – State models for linear and time invariant Systems – Solution of state andoutput equation in controllable canonical form – Concepts of controllability andobservability.

TOTAL (L: 45+T:30): 75 PERIODS

COURSE OUTCOMES

At the end of the course, the student should have the :

- Ability to develop various representations of system based on the knowledge of Mathematics, Science and Engineering fundamentals.
- Ability to do time domain and frequency domain analysis of various models of linear system.
- Ability to interpret characteristics of the system to develop mathematical model.
- Ability to design appropriate compensator for the given specifications.
- Ability to come out with solution for complex control problem.
- Ability to understand use of PID controller in closed loop system.

TEXT BOOKS

1. Nagarath, I.J. and Gopal, M., “Control Systems Engineering”, New Age International Publishers, 2017.
2. Benjamin C. Kuo, “Automatic Control Systems”, Wiley,2014.

REFERENCES

1. Katsuhiko Ogata, “Modern Control Engineering”, Pearson,2015.
2. Richard C.Dorf and Bishop, R.H., “Modern Control Systems”, Pearson Education,2009.
3. John J.D., Azzo Constantine, H. and HoupisSttuart, N Sheldon, “Linear Control System Analysis and Design with MATLAB”, CRC Taylor& Francis Reprint2009.
4. Rames C.Panda and T. Thyagarajan, “An Introduction to Process Modelling Identification and Control of Engineers”, Narosa Publishing House,2017.
5. M.Gopal, “Control System: Principle and design”, McGraw Hill Education,2012.
6. NPTEL Video Lecture Notes on “Control Engineering “by Prof. S. D. Agashe,IITBombay.

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SuPerfect Solutions

Date: 25-09-2022

Ref No: SUP/INT/22016

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that Mr. LOGESH KUMAR M pursuing his third year EEE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 17.09.2022 to 27.09.2022.**

We appreciate his participation with interest towards the training program.

For SUPERFECT SOLUTIONS,

AUTHORIZED SIGNATORY

SUPERFECT SOLUTIONS S. SALEM.

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM - 624 401.

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
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SUPERFECT SOLUTIONS

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EE8501	POWER SYSTEM ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To model the power system under steady state operating condition
- To understand and apply iterative techniques for power flow analysis
- To model and carry out short circuit studies on power system
- To model and analyze stability problems in power system

UNIT I POWER SYSTEM **9**

Need for system planning and operational studies - Power scenario in India - Power system components – Representation - Single line diagram - per unit quantities - p.u. impedance diagram - p.u. reactance diagram - Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix from primitive parameters - Representation of off- nominaltransformer - Formation of bus admittance matrix of large power network.

UNIT II POWER FLOW ANALYSIS **9**

Bus classification - Formulation of Power Flow problem in polar coordinates - Power flow solution using Gauss Seidel method - Handling of Voltage controlled buses - Power Flow Solution by Newton Raphson method.

UNIT III SYMMETRICAL FAULT ANALYSIS **9**

Assumptions in short circuit analysis - Symmetrical short circuit analysis using Thevenin's theorem - Bus Impedance matrix building algorithm (without mutual coupling) - Symmetrical fault analysis through bus impedance matrix - Post fault bus voltages - Fault level - Current limiting reactors.

UNIT IV UNSYMMETRICAL FAULT ANALYSIS **9**

Symmetrical components - Sequence impedances - Sequence networks - Analysis of unsymmetrical faults at generator terminals: LG, LL and LLG - unsymmetrical fault occurringat any point in a power system - computation of post fault currents in symmetrical componentand phasordomains.

UNIT V STABILITY ANALYSIS **9**

Classification of power system stability – Rotor angle stability - Swing equation - Swingcurve - Power-Angle equation - Equal area criterion - Critical clearing angle and time - Classical step-by-step solution of the swing equation – modified Euler method.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to model the power system under steady state operating condition
- Ability to understand and apply iterative techniques for power flow analysis
- Ability to model and carry out short circuit studies on power system
- Ability to model and analyze stability problems in power system
- Ability to acquire knowledge on Fault analysis.
- Ability to model and understand various power system components and carryoutpower flow, short circuit and stability studies.

TEXT BOOKS:

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

REFERENCES

1. Pai M A, 'Computer Techniques in Power System Analysis', Tata Mc Graw-HillPublishing 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.

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SINGLE PHASE FAULT ANALYSIS

A MINI PROJECT REPORT

Submitted by

HARISH.G	**(920820105007)**
MAHENDRA.S	**(920820105011)**
SARAVANAKUMAR.S	**(920820105014)**

In partial fulfillment for the award of the degree

Of

BACHULAR OF ENGINEERING

ELECTRICAL AND ELECTRONICS ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY,

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BONAFIDE CERTIFICATE

Certified this project report "SINGLE PHASE FAULT ANALISYS" is the bonafide work of "MAHENDRA.S (920820105011) , SARAVANAKUMAR.S (920820105014) and HARISH.G (920820105005) who carried out the project work under my supervision.

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INTERNAL EXAMINER

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ABSRACT

This paper to develop an automatic tripping mechanism for the single phase supply system. The project output resets automatically after a brief interruption in the event temporary fault while it remains in tripped condition in case of permanent fault. There are some failures due to some faults which can be temporary or permanent. These faults lead to substantial damage to the power system equipment. It is common, the faults might be LG (Line to Ground) in the supply systems and these faults in single phase supply system can affect the power system. To overcome this problem a system is built, which can sense these faults and automatically disconnects the supply to avoid damage. This system is built using single phase transformers having input 230 volt and output at 12 volt. This concept low voltage testing of fault conditions is followed. A switch is used to create the LG fault in low voltage side, for activating the tripping mechanism. Short duration fault returns the supply to the load immediately called as temporary trip while long duration shall result in permanent trip. The idea in the future can be extended to developing a device to send message to the authorities via SMS by interfacing a GSM modem.

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CHAPTER 5

CONCLUSION

Various types of faults are created to develop an auto tripping mechanism for the single phase supply system while temporary fault and permanent fault occur. Here microcontroller has been used with relay for the fault analysis; there are the short duration fault returns to the supply to the load immediately called a temporary fault while long duration shall result in permanent

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

OBJECTIVES:

To impart knowledge on the following Topics

- Architecture of µP8085 & µC8051
- 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 MICROCONTROLLER 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”, PHILearning Pvt. Ltd,2016.
2. R.S. Gaonkar, ‘Microprocessor Architecture Programming and Application’, with8085, Wiley Eastern Ltd., New Delhi,2013.
3. Muhammad Ali Mazidi& Janice GilliMazidi, R.D.Kinely ‘The 8051 Micro Controllerand 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 ageInternational 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 HillEdu,2016
5. Douglas V.Hall, ‘Microprocessor and Interfacing’, McGraw HillEdu,2016.

RESISTANCE BASED TEMPERATURE SENSOR USING ESP32 IN HOME APPLICATIONS

A MINI PROJECT REPORT

Submitted by

A.GOVINTHAVASAN	**(920820105003)**
V.RAMAR	**(920820105013)**
A.THAVAMANI	**(920820105018)**

In partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

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NPR COLLEGE OF ENGINEERING AND TECHNOLOGY, NATHAM

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MAY-2023

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BONAFIDE CERTIFICATE

Certified that this project report **"RESISTANCE BASED TEMPERATURE SENSOR USING ESP32 IN HOME APPLICATIONS"** is the bonafide work of **"A.GOVINTHAVASAN (920820105003), V.RAMAR (920820105013), A.THAVAMANI (920820105018)"** Who carried out the project work under my supervision.

SIGNATURE

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EXTERNAL EXAMINAR

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ABSTRACT

Resistance temperature detector, RTD, can be manufactured with microelectronics processing techniques. However, the manufactured Resistor requires an extra step for adjustment of the 0degC reference resistance, R_0 .we have evaluated the fabrication of nickel-RTD transducers for smart temperature sensors. By applying the smart sensor concept, the resistance adjustment step is avoided, as the calibration curve can be stored in the Transducer Electronics Datasheet (TEDS). The RTDs have been fabricated by thermal evaporation of nickel onto an alumina substrate.

Calibration curves have been measured as a function of temperature, and a high linearity is observed. Two different prototypes for the conditioning and processing electronics are analysed. An advantage of the digital transfer of data is that resolution is not lost in the transfer process. Data can be viewed by any computer on the Internet through a standard browser either directly or through a service website which periodically polls the sensor and stores the data for later review.

Compare to other temperature sensors RTD is the more accuracy to sense the temperature level.

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CONCLUSION

An RTD stands for "Resistance Temperature Detector" and it is a sensor which is used to measure temperature. It works following a basic principle of when the temperature of a metal increases, the resistance to the flow of electricity increases as well which is used to measure and indicate the accurate value of temperature in terms of Celsius. In many home applications like heater, electric kitchen, food heating process it can be applied.

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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.

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR- Introduction to Driver and snubber circuits.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulse converters– performance parameters –Effect of source inductance— Firing Schemes for converter–Dual converters, Applications-light dimmer, Excitation system, Solar PV systems.

UNIT III DC TO DC CONVERTERS 9

Step-down and step-up chopper-control strategy– Introduction to types of choppers-A, B, C, D and E -Switched mode regulators- Buck, Boost, Buck- Boost regulator, Introduction to Resonant Converters, Applications-Battery operated vehicles.

UNIT IV INVERTERS 9

Single phase and three phase voltage source inverters (both 120^0 mode and 180^0 mode)– Voltage& harmonic control--PWM techniques: Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM – Introduction to space vector modulation –Current source inverter, Applications-Induction heating, UPS.

UNIT V AC TO AC CONVERTERS 9

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

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to analyse AC-AC and DC-DC and DC-AC converters.
- Ability to choose the converters for real time applications.

TEXT BOOKS:

1. M.H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third Edition, New Delhi,2004.
2. P.S.Bimbra "Power Electronics" Khanna Publishers, third Edition, 2003.
3. Ashfaq Ahmed 'Power Electronics for Technology', Pearson Education, Indian reprint,2003.

REFERENCES

1. Joseph Vithayathil,' Power Electronics, Principles and Applications', McGraw Hill Series, 6th Reprint, 2013.
2. Philip T. Krein, "Elements of Power Electronics" Oxford University Press, 2004 Edition.
3. L. Umanand, "Power Electronics Essentials and Applications", Wiley, 2010.
4. Ned Mohan Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.
5. S.Rama Reddy, 'Fundamentals of Power Electronics', Narosa Publications, 2014.
6. M.D. Singh and K.B. Khanchandani, "Power Electronics," Mc Graw Hill India, 2013.
7. JP Agarwal," Power Electronic Systems: Theory and Design" 1edition, Pearson Education,2002.

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TVS Training & Services

Date: 07-01-2023

Ref No: SUP/INT/23002

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that MOHAMMED ASHIK S for pursuing his third year EEE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 18.01.2023 to 29.01.2023.**

We appreciate his participation with interest towards the training program.

NPR COLLEGE OF ENGG & TECH • NATHAM-624 401 •

Dr. J.SUNDAR...
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Mr. G. Narayanamurthy
(CEO, TVS Training & Services Ltd.)

EE8591	DIGITAL SIGNAL PROCESSING	L	T	P	C
		2	2	0	3

OBJECTIVES:

To impart knowledge about the following topics:

- Signals and systems & their mathematical representation.
- Discrete time systems.
- Transformation techniques & their computation.
- Filters and their design for digital implementation.
- Programmability digital signal processor & quantization effects.

UNIT I INTRODUCTION 6+6

Classification of systems: Continuous, discrete, linear, causal, stability, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

UNIT II DISCRETE TIME SYSTEM ANALYSIS 6+6

Z-transform and its properties, inverse z-transforms; difference equation – Solution by Z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Discrete Time Fourier transform , magnitude and phase representation.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION 6+6

Discrete Fourier Transform- properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT &DIF using radix 2 FFT – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS 6+6

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. Analog filter design – Butterworth and Chebyshev approximations; IIR Filters, digital design using impulse invariant and bilinear transformation Warping, pre warping.

UNIT V DIGITAL SIGNAL PROCESSORS 6+6

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DS Processors.

TOTAL : 60 PERIODS

OUTCOMES:

1. Ability to understand the importance of Fourier transform, digital filters and DS Processors.
2. Ability to acquire knowledge on Signals and systems & their mathematical representation.
3. Ability to understand and analyze the discrete time systems.
4. Ability to analyze the transformation techniques & their computation.
5. Ability to understand the types of filters and their design for digital implementation.
6. Ability to acquire knowledge on programmability digital signal processor & quantization effects.

TEXT BOOKS:

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, PHI. 2003.
2. S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', McGraw Hill Edu, 2013.
3. Lonnie C.Ludeman ,"Fundamentals of Digital Signal Processing", Wiley, 2013

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1. Poorna Chandra S, Sasikala. B ,Digital Signal Processing, Vijay Nicole/TMH,2013.
2. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab", Cengage Learning,2014.
3. B.P.Lathi, 'Principles of Signal Processing and Linear Systems', Oxford University Press, 2010 3. Taan S. ElAli, 'Discrete Systems and Digital Signal Processing with Mat Lab', CRC Press, 2009.
4. SenM.kuo, woonseng…s.gan,"Digital Signal Processors, Architecture,Implementations & Applications, Pearson,2013
5. Dimitris G.Manolakis, Vinay K. Ingle, applied Digital SignalProcessing,Cambridge,2012

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AUTOMATIC RAIN WATER PROTECTION FOR CROPS

A PROJECT REPORT

Submitted by

SARWESH R	**(920820105016)**
JUSTIN THIRAVIYAM A	**(920820105008)**
BHARATHI RAJA C	**(920820105002)**

in partial fulfillment for the award of the

degree of

BACHELOR OF ENGINEERING

IN

ELECTRICAL AND ELECTRONICS ENGINEERING

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Certified that this project report **"AUTOMATIC RAIN WATER PROTECTION FOR CROPS"** is the bonafide work of **"SARWESH.R (920820105016), JUSTIN THIRAVIYAM A (920820105008) and BHARATHI RAJA C (920820105002)"** who carried out the project work under my supervision.

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INTERNAL EXAMINER 30/5/23

EXTERNAL EXAMINER 30/5/23

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Abstract

In this project we present Idea related to agricultural based system in which as per our observation during the rainy seasons the cultivated crops gets affected due to the heavy rain fall. The main theme of this project is that to prevent the crops from the heavy rain. The rain sensor is used for the working of automatic roof. This system involves protects the crops by the auto roof which covers the whole field. The rain sensor is activated when there is a rain fall. If the water level is beyond the normal level it will gives intimation to the controller. So when the sensor is 'ON', it will gives intimation to the controller, and it will indicate to the DC motor and it will automatically open the roof. In this project, the roof is open automatically when the sensor is 'ON'. This complete system can be handled manually If there is any problem with opening the roof automatically, it is blend idea with controlling operation done through Arduino. The power is supplied to this project is using battery . Direct power supply can also be fabricated which affect the basic cost to build entire system.

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CHAPTER 5

CONCLUSION

A system to monitor temperature, humidity, moisture levels in the soil was designed and the project provides an opportunity to study the existing systems, along with their features and drawbacks. Agriculture is one of the most waterconsuming activities. The proposed system can be used to switch the motor (on/off) depending on favorable condition of plants i.e., sensor values, thereby automating the process of irrigation. which is one of the most time efficient activities in farming, which helps to prevent over irrigation or under irrigation of soil thereby avoiding crop damage. The farm owner can monitor the process online through Front End Structure. By this work, the wastage of water and the consumption of power by motor can be reduced so that they are conserved for the future use. Through this project it can be concluded that there can be considerable development in farming with the use of IOT and automation..

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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 Countingdevices, 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 (I^2C) –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.

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SPEED AND DIRECTION CONTROL OF DC MOTOR USING ANDROID MOBILE APPLICATION

A PROJECT REPORT

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SHYLESH KUMAR V (920820105317)

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INTERNAL EXAMINER

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ABSTRACT

This system DC motor Controller by Android is developed to control the speed of the DC motor in both clockwise and anticlockwise direction. For this DC motor is interfaced to the 8051 microcontrollers. A Bluetooth modem is used to receive direction commands and PWM commands. When an Android device sends commands, it is received by the Bluetooth modem which then sends the commands to the microcontroller. The microcontroller the controls the DC motor through motor driver. The entire system is powered by 12V transformer. LCD display is used to show the status and the speed of the DC motor. The android application is used to control the entire system. The start button is first clicked to start the motor and then the motor can run in both clockwise and anticlockwise direction. Simultaneously the status of the system is displayed on the LCD screen and also the speed of the DC motor is displayed on the screen. Thus the speed of the motor can be increased or decreased in clockwise or anticlockwise direction with the help of this android application.

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CHAPTER - 5

CONCLUSION

In this work, various methods for wirelessly regulating the speed and direction of a DC motor are examined. Different kinds of microcontrollers are employed in each technique. Speed control has been made possible by microcontroller programming, which provides high performance, dependable operation, simple control, and greater protection.

Through the use of an Android smartphone application and Bluetooth technology, the DC motor's speed and direction may be controlled in this manner. Remote communication is thus also made possible.

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EE8004	MODERN POWER CONVERTERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge about the following topics:

- Switched mode power supplies
- Matrix Converter
- Soft switched converters

UNIT I SWITCHED MODE POWER SUPPLIES(SMPS) 9

DC Power supplies and Classification; Switched mode dc power supplies - with and without isolation, single and multiple outputs; Closed loop control and regulation; Design examples on converter and closed loop performance.

UNIT II AC-DC CONVERTERS 9

Switched mode AC-DC converters. synchronous rectification - single and three phase topologies - switching techniques - high input power factor . reduced input current harmonic distortion. improved efficiency. with and without input-output isolation. performance indices design examples

UNIT III DC-AC CONVERTERS 9

Multi-level Inversion - concept, classification of multilevel inverters, Principle of operation, main features and analysis of Diode clamped, Flying capacitor and cascaded multilevel inverters; Modulation schemes.

UNIT IV AC-AC CONVERTERS WITH AND WITHOUT DC LINK 9

Matrix converters. Basic topology of matrix converter; Commutation – current path; Modulation techniques-scalar modulation, indirect modulation; Matrix converters only

AC-DC converter; AC-AC converter with DC link - topologies and operation - with and without resonance link - converter with dc link converter; Performance comparison with matrix converter with DC link converters.

UNIT V SOFT-SWITCHINGPOWER CONVERTERS 9

Soft switching techniques. ZVS, ZCS, quasi resonance operation; Performance comparison hard switched and soft switched converters.AC-DC converter, DC-DC converter, DC-AC converter.; Resonant DC power supplies .

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to suggest converters for AC-DC conversion and SMPS

TEXT BOOKS:

1. Power Electronics Handbook, M.H.Rashid, Academic press, New york,2000.
2. Advanced DC/DC Converters, Fang Lin Luo and Fang Lin Luo, CRC Press, NewYork,2004.
3. Control in Power Electronics- Selected Problem, Marian P.Kazmier kowski, R.Krishnan and Frede Blaabjerg, Academic Press (Elsevier Science),2002.

REFERENCES:

1. Power Electronic Circuits, Issa Batarseh, John Wiley and Sons,Inc.2004
2. Power Electronics for Modern Wind Turbines, Frede Blaabjerg and ZheChen, Morgan & Claypool Publishers series, United States of America,2006.
3. Krein Philip T, Elements of Power Electronics, Oxford University press, 2008
4. Agarwal ,Power Electronics: Converters, Applications, and Design, 3rd edition, JaiP, Prentice Hall,2000
5. L. Umanand, Power Electronics: Essentials & Applications, John Wiley and Sons,2009.

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TVS Training & Services

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Ref No: SUP/INT/23002

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TO WHOM IT MAY CONCERN

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We appreciate his participation with interest towards the training program.

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TVS Training & Services

Date: 07-01-2023

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TO WHOM IT MAY CONCERN

This is to certify that RAMAR V for pursuing his third year EEE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 18.01.2023 to 29.01.2023.**

We appreciate his participation with interest towards the training program.

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EE8601	SOLID STATE DRIVES	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- Steady state operation and transient dynamics of a motor load system.
- Analyze the operation of the converter/chopper fed dc drive, both qualitatively and quantitatively.
- Operation and performance of AC motor drives.
- Analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

UNIT I DRIVE CHARACTERISTICS **9**

Electric drive – Equations governing motor load dynamics – steady state stability – multi quadrant Dynamics: acceleration, deceleration, starting & stopping – typical load torque characteristics – Selection of motor.

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE **9**

Steady state analysis of the single and three phase converter fed separately excited DC motor drive– continuous conduction – Time ratio and current limit control – 4 quadrant operation of converter / chopper fed drive-Applications.

UNIT III INDUCTION MOTOR DRIVES **9**

Stator voltage control–V/f control– Rotor Resistance control-qualitative treatment of slip power recovery drives-closed loop control— vector control- Applications.

UNIT IV SYNCHRONOUS MOTOR DRIVES **9**

V/f control and self-control of synchronous motor: Margin angle control and power factor control-Three phase voltage/current source fed synchronous motor- Applications.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES **9**

Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback–armature voltage control and field weakening mode – Design of controllers; current controller and speed controller- converter selection and characteristics.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to understand and suggest a converter for solid state drive.
- Ability to select suitability drive for the given application.
- Ability to study about the steady state operation and transient dynamics of a motor load system.
- Ability to analyze the operation of the converter/chopper fed dc drive.
- Ability to analyze the operation and performance of AC motor drives.
- Ability to analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

TEXT BOOKS:

1. Gopal K.Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, 1992.
2. Bimal K.Bose. Modern Power Electronics and AC Drives, Pearson Education, 2002.
3. R.Krishnan, Electric Motor & Drives: Modeling, Analysis and Control, Pearson, 2001.

REFERENCES:

2. Vedam Subramanyam, " Electric Drives Concepts and Applications ", 2e, McGraw Hill, 2016
3. Shaahin Felizadeh, "Electric Machines and Drives", CRC Press (Taylor and Francis Group), 2013.
4. John Hindmarsh and Alasdain Renfrew, "Electrical Machines and Drives System," Elsevier 2012.
5. Theodore Wildi, " Electrical Machines, Drives and power systems ,6th edition, Pearson Education ,2015
6. N.K. De., P.K. SEN" Electric drives" PHI, 2012.

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VOLTAGE OREINTED CONTROLLER BASED VIENNA RECTIFIER FOR EV CHARGING STATIONS

A PROJECT REPORT

Submitted by

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EXTERNAL EXAMINER

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ABSTRACT

Vienna rectifiers have gained popularity in recent years for AC to DC power conversion for many industrial applications such as welding power supplies, data centers, telecommunication power sources, aircraft systems, and electric vehicle charging stations. The advantages of this converter are low total harmonic distortion (THD), high power density, and high efficiency. Due to the inherent current control loop in the slide mode voltage-oriented control strategy proposed in this project, good steady-state performance and fast transient response can be ensured. The proposed voltage-oriented control of the Vienna rectifier with a slide controller (VOC-VR) has been simulated using MATLAB/Simulink. The simulations indicate that prove that the proposed rectifier system can be applied for high power applications such as DC fast-charging stations and welding power sources.

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CHAPTER 8
CONCLUSION

In this work, a three-level Vienna rectifier based on a voltage-oriented controller (VOC-VR) has been designed and experimentally tested. The proposed system has been simulated using MATLAB Simulink software targeting high power applications such as DC-fast chargers for electric vehicles. The proposed controller for Vienna rectifier focused on combining voltage-oriented controllers with the PWM method. In proposed design, the reactive and unstable active currents are counteracted by the input and output filters and Voltage Oriented Controller (VOC) with Vienna rectifier. The proposed design also guarantees a sinusoidal current at the input side with minimum ripples and distortions

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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.

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.

UNIT III SOLAR PV AND THERMAL SYSTEMS 9

Solar Radiation, Radiation Measurement, Solar Thermal Power Plant, Central Receiver Power Plants, Solar Ponds.- Thermal Energy storage system with PCM- Solar Photovoltaic systems : Basic Principle of SPV conversion – Types of PV Systems- Types of Solar Cells, Photovoltaic cell concepts: Cell, module, array ,PV Module I-V Characteristics, Efficiency & Quality of the Cell, series and parallel connections, maximum power point tracking, Applications.

UNIT IV BIOMASS ENERGY 9

Introduction-Bio mass resources –Energy from Bio mass: conversion processes-Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal Electricity. Mini/micro hydro power: Classification of hydropower schemes, Classification of water turbine, Turbine theory, Essential components of hydroelectric system.

UNIT V OTHER ENERGY SOURCES 9

Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC)- Hydrogen Production and Storage- Fuel cell : Principle of working- various types - construction and applications. Energy Storage System- Hybrid Energy Systems.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to create awareness about renewable Energy Sources and technologies.
- Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.
- Ability to recognize current and possible future role of renewable energy sources.
- Ability to explain the various renewable energy resources and technologies and their applications.
- Ability to understand basics about biomass energy.
- Ability to acquire knowledge about solar energy.

TEXT BOOKS:

1. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.
2. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
3. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning,USA, 2016.

REFERENCES:

1. A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011
2. Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.
3. Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011
4. Bradley A. Striebig, Adebayo A.Ogundipe and Maria Papadakis," Engineering Applications in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.
5. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
6. Shobh Nath Singh, 'Non-conventional Energy resources' Pearson Education ,2015.

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PROGRAMMED SOLAR PANEL PURGATION

A PROJECT REPORT

Submitted by

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MAY 2023

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EXTERNAL EXAMINER

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ABSTRACT

Solar energy is the most appealing green energy conversion technology. Interestingly, the use of solar panels has increased enormously because they are inexpensive and widely available. Dust accumulation on the solar panel is one of the major factors affecting Photo Voltaic (PV) panel performance as well as the cost of maintaining and producing electricity from a PV system. It was observed that dust builds up on the PV module's front surface which blocks the sun's incident light had a significant impact on the performance of PV modules so it significantly decreased their ability to produce power output capacity by up to 58% and their efficiency by 58%. Hence, an Arduino based automated cleaning system has been designed to clean the dust on a regular basis. For cleaning technique, this project employs two procedures which is dry cleaning and wet cleaning. According to experimental findings, the suggested cleaning technique improves PV power production efficiency from 87 to 96%.

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CHAPTER 7

CONCLUSION

An autonomous solar panel cleaning system is proposed and implemented in this dy using readily available components. The proposed system is low-cost. This posed cleaning technique is based on a two-stage mechanism, with dry cleaning doing first step. The second step is to clean with water. This feature protects the panel's ety because any type of scratch is not visible during the experimental tests, and it is lized to boost output efficiency and reduce human labor. The cleaning procedure has en shown in tests to be effective.

Application

- This simple system can be used at residential, office, power plant to ensure better efficiency.
- We can install any types of panel &its operating process is so smooth.

Limitation of the work

There are few limitations in our project that's are-

Wet cleaning is done only once in a week.

We want to change the roller frequently.

Future Work

- We would like to deal with reducing the friction losses in our project.
- We can add dust sensor to detect the dust density for cleaning the panel.
- The movement of roller operation can be controlled using mobile application.
- Further, the charging of battery can be done by taking the output from the solar panel by using converter.

EE8702 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 CONTROL 9

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.

TOTAL : 45 PERIODS

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. 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.

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TVS Training & Services

Date: 11-01-2023

Ref No: SUP/INT/23002

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that AHAMED AFZAR A for pursuing his final year EEE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 21.01.2023 to 03.02.2023.**

We appreciate his participation with interest towards the training program.

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.
Principal
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Natham, Dindigul (Dt) - 624 401.

Mr. G. Narayanamurthy
(CEO, TVS Training & Services Ltd.)

TVS Training & Services

Date: 11-01-2023

Ref No: SUP/INT/23002

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that LAKSHMI PRIYA A for pursuing his final year EEE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 21.01.2023 to 03.02.2023.**

We appreciate his participation with interest towards the training program.

N.P.R. COLLEGE OF ENGG. & TECH. * NATHAM-624 401 *

Dr. J.SUNDARARAJAN,
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Mr. G. Narayanamurthy
(CEO, TVS Training & Services Ltd.)

EC3301 ELECTRON DEVICES AND CIRCUITS L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the structure of basic electronic devices.
- Be exposed to active and passive circuit elements.
- Familiarize the operation and applications of transistor like BJT and FET.
- Explore the characteristics of amplifier gain and frequency response.
- Learn the required functionality of positive and negative feedback systems.

UNIT I PN JUNCTION DEVICES 9

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

UNIT II TRANSISTORS AND THYRISTORS 9

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

UNIT III AMPLIFIERS 9

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

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

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

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS 9

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

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be ability to:

- Explain the structure and working operation of basic electronic devices.
- Able to identify and differentiate both active and passive elements
- Analyze the characteristics of different electronic devices such as diodes and transistors
- Choose and adapt the required components to construct an amplifier circuit.
- Employ the acquired knowledge in design and analysis of oscillators

TEXT BOOKS:

1. . David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th edition 2008.
2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press

REFERENCES:

1. Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHIlearning 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" TataMcGraw 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 Biomedicaln Instrumentation", CRCPress, 2004.

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Labo Scientific
563,7th Cross Main Road, Srinivasa Nagar, Trichy -620017.
laboscientificindia@gmail.com, 8667767992.

labo scientific Engineering

Date:26.09.2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that PRAVEENKUMAR U of third year EEE of NPR College of Engineering& Technology, Natham has successfully completed the Inplant training in our concern from 14.09.2022 to 25.09.2022.

During this period his conduct was sincere and hardworking

With Regards

For LABO - SCIENTIFIC

Proprietor

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

N.P.R. COLLEGE OF ENGG. & TECH * NATHAM-624 401 *

PH3202 PHYSICS FOR ELECTRICAL ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To make the students to understand the basics of dielectric materials and insulation.
- To understand the electrical properties of materials including free electron theory, applicationsof quantum mechanics and magnetic materials.
- To instil knowledge on physics of semiconductors, determination of charge carriers and deviceapplications
- To establish a sound grasp of knowledge on different optical properties of materials, opticaldisplays and applications
- To inculcate an idea of significance of nano structures, quantum confinement and ensuingnano device applications.

UNIT I DIELECTRIC MATERIALS AND INSULATION 9

Matter polarization and relative permittivity: definition – dipole moment and polarization vector P-polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization – frequency dependence – local field and Causius-Mossetti equation – dielectric constant and dielectric loss – Gauss's law and boundary conditions – dielectric strength, introduction to insulation breakdown in gases, liquids and solids – capacitor materials – typical capacitor constructions – piezoelectricity, ferroelectricity and pyroelectricity – quartz oscillators and filters – piezo and pyroelectric crystals.

UNIT II ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory: Tunneling – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – paramagnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS 9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carriertransportin Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices –excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

UNIT V NANO DEVICES 9

Density of states for solids - Significance between Fermi energy and volume of the material – Quantumconfinement – Quantum structures – Density of states for quantum wells, wires and dots – Band gap ofnanomaterials –Tunneling – Single electron phenomena – Single electron Transistor. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance – Carbon nanotubes: Properties and applications - Spintronic devices and applications – Optics in quantum structures – quantum well laser.

TOTAL: 45 PERIODS

OUTCOMES:

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

CO1: know basics of dielectric materials and insulation.

CO2:gain knowledge on the electrical and magnetic properties of materials and their applications

CO3:understand clearly of semiconductor physics and functioning of semiconductor devices

CO4:understand the optical properties of materials and working principles of various optical devices**CO5:**appreciate the importance of nanotechnology and nanodevices.

TEXT BOOKS:

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (IndianEdition), 2020.
2. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition),2006.
3. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (IndianEdition), 2009.

REFERENCES:

1 .Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology**,** McGraw-Hill Education (Indian Edition), 2019.
3. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4. Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.
5. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-HillEducation (Indian Edition), 2020.

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Reach the Star
NAAC

Industrial Visit to VEI Technologies, Chennai

PERMISSION LETTER

From

Dr. P.S. Satheesh Kumar,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology,Natham,
Dindigul – 624 401.

To

The Administrative Office,
NPR Group of Institutions,
Natham,
Dindigul – 624 401.

Through Proper Channel

Sub: Requesting permission for Industrial visit – Reg.

Respected Sir,

I am writing to formally request permission for an industrial visit to VEI Technologies for our 1st Year students. The visit is scheduled to take place on two days, as outlined below:

I Batch - Departments: CSE A, CSE B, and EEE on 20.06.2023

II Batch - Departments: ECE, AI & DS, MECH and IT on 21.06.2023

We are planning for a total of 270 students from the 1st Year, consisting of 180 boys and 90 girls, accompanied by 6 staff members. The staff members accompanying the students are Dr. P.S. Satheesh Kumar, Prof/Physics, Dr. N. Kavitha, ASP/Physics, Dr. P. Rani, ASP/Maths, Dr. P. Shanmuga Priya, ASP/English, Dr. N. Prabakaran, ASP/Chemistry and Mrs. C. Yogitha, AP/Maths.

We assure you that all necessary arrangements regarding transportation, supervision, and safety measures will be diligently taken care of throughout the visit.

We kindly request your approval for this industrial visit, as it will significantly contribute to the academic and professional development of our students.We eagerly await your favorable response.

Yours Faithfully,

(Dr. P. S. Satheesh Kumar)

Natham,
12.06.2023

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul Dist.

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Industrial Visit to VEI Technologies, Chennai

REQUISITION LETTER

From,
Dr. P.S. Satheesh Kumar,
Head of the Department,
Department of Science and Humanities,
NPR College of Engineering & Technology, Natham,
Dindigul – 624 401.

To,
Dr B Ezhilavan,
Managing Director,
VEI Technologies,
Chennai.

Dear Sir,
Greetings!
I hope this letter finds you in good health and high spirits. I am writing on behalf of NPR College of Engineering and Technology, situated in Natham, Dindigul district. Our institution is dedicated to the personal and professional development of students from rural backgrounds, offering a range of UG and PG courses.

It has been a longstanding practice in our Science and Humanities Department to organize industrial visits for our students every semester, aiming to provide them with practical exposure and industry insights. In line with this, we have planned an industrial visit to VEI Technologies for our 270 first year students and 6 accompanying staff members. The visit is scheduled for two days, with two batches visiting on 20/6/23 and 21/6/23, respectively.
We assure you, sir, that our students will adhere strictly to safety protocols and will not disrupt your regular operations during their visit.

We humbly request your esteemed organization to grant us permission for this industrial visit. We would greatly appreciate if you could confirm the permission through a formal letter or email correspondence.

We look forward to the opportunity for our students to benefit from this valuable learning experience at VEI Technologies.

Natham,
12.06.23

Yours faithfully,

(Dr. P. S. Satheesh Kumar)

Industrial Visit to VEI Technologies, Chennai

CONFIRMATION LETTER FROM INDUSTRY

Gmail

Inbox

info@veitechnologies.com Wed, JUNE 14,2023, 12.28 PM

To:

hodmathematicsnprcet@gmail.com

Dear Sir,

We are happy to give permission for the industrial visit to your wards in VEI Technologies, Chennai. Kindly remind us one day in advance for the visit schedule also send the original letter copy with your hand during the visit.

Thanks and Regards,

Dr B Ezhilavan,
Managing Director,
VEI Technologies,
Chennai.

DEPARTMENT OF SCIENCE AND HUMANITIES Industrial Visit to VEI Technologies,Chennai				
S.No.	REGISTER NUMBER	NAME OF THE STUDENT	DEPARTMENT	GENDER
113	920822104114	Veera Ramana M	CSE- B	Male
114	920822104115	Vibin Dipak K	CSE- B	Male
115	920822104116	Vignesh M	CSE- B	Male
116	920822104117	Vignesh R	CSE- B	Male
117	920822104118	Vijayalakshmi A	CSE- B	Female
118	920822104119	Vijayan S	CSE- B	Male
119	920822104120	Vimal Sanjay A	CSE- B	Male
120	920822104121	Visali S	CSE- B	Female
121	920822104122	Vishnupriya D	CSE- B	Female
122	920822104123	Viswa B	CSE- B	Male
123	920822104124	Yagavarman S	CSE- B	Male
124	920822104125	Yoganth M	CSE- B	Male
125	920822104126	Yohith Kumar Nagarajan	CSE- B	Male
126	920822105001	Abhin Krishna U V	EEE	Male
127	920822105002	Abirami P	EEE	Female
128	920822105003	Ajay S	EEE	Male
129	920822105004	Ariyadharshini B	EEE	Female
130	920822105005	Atheeswaran M	EEE	Male
131	920822105006	Chellan P	EEE	Male
132	920822105007	Deenadhayalan T	EEE	Male
133	920822105008	Dhanushkumar K	EEE	Male
134	920822105009	Dharani M	EEE	Female
135	920822105010	Dharani Daran M	EEE	Male
136	920822105011	Dhinesh Prasad S	EEE	Male
137	920822105012	Eswara Pandi R	EEE	Male
138	920822105013	Hari Haran G	EEE	Male
139	920822105014	Harini R	EEE	Female
140	920822105015	Kaja Mohaideen S	EEE	Male
141	920822105016	Karuppaiah C	EEE	Male
142	920822105017	Mohammed Hanif H	EEE	Male
143	920822105018	Nikeelash Bala M	EEE	Male
144	920822105019	Pandi Manikandan N	EEE	Male
145	920822105020	Premkumar K	EEE	Male
146	920822105021	Raghul Kanna S	EEE	Male
147	920822105022	Rajapandian R	EEE	Male
148	920822105023	Sakthi Vignesh S	EEE	Male

HOD-I Year
(Dr. P.S. Sathees Kumar)

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
PRINCIPAL
N.P.R. College of Engineering & Technology

DEPARTMENT OF SCIENCE AND HUMANITIES

Industrial Visit to VEI Technologies, Chennai

Summary Report

Date: June 20th, 2023 (I Batch) and June 21st, 2023 (II Batch)
Venue: VEI Technologies, Poonamallee, Chennai

Purpose: The industrial visit to VEI Technologies aimed to offer students from NPRCET a practical insight into industry operations and various departments. It provided an opportunity for 270 first-year students (90 girls and 180 boys) in two batches, accompanied by six staff members, to gain valuable knowledge about the functioning of an R&D company specializing in web development and software solutions.

Schedule:

- **Departure:** Students were picked up from NPRCET on 20.6.23(I Batch) and on 21.6.23(II Batch) at 9:30 pm and traveled by bus to Chennai.
- **Arrival:** The group reached Chennai at 6:00 am the following day.
- **Visit to VEI Technologies:** From 9:00 am to 12:00 pm, students toured the facility, gaining insights into the company's various departments and operations.
- **Meeting with Director:** Students had the opportunity to meet Mr. Babu Ezhilavan, the Director of VEI Technologies, who provided information about the company's services, including web application development, website designing, e-commerce solutions, and more. They also learned about value-added courses offered by the company in areas such as IoT, Java and Python.
- **Leisure Activities:** After lunch at a nearby restaurant from 12:00 p.m to 1:00 p.m, students visited the planetarium from 1:00 p.m to 3:00 p.m, followed by a visit to the zoo from 3:00 p.m to 5:00 p.m, and a trip to the beach from 5:00 p.m to 6:30 p.m.
- **Return:** The students began their return journey at 8:00 p.m and reached NPRCET on 20.6.23(I Batch) and on 21.6.23(II Batch) at 5:00 a.m the next day.

Outcome: The industrial visit provided students with a practical understanding of industry operations and exposed them to various aspects of web development and software solutions. The interaction with staff and the Director of VEI Technologies enhanced the students' knowledge about the industry and its potential career paths. Additionally, the inclusion of leisure activities ensured a well-rounded experience for the students.

Conclusion: The visit to VEI Technologies was a valuable learning experience for the students, allowing them to bridge the gap between theoretical knowledge and practical application in the industry. The well-organized itinerary balanced educational insights with recreational activities, making it a memorable and enriching trip for all participants.

On completion of this industrial visit, the following Pos and PSOs were enabled.

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
√				√		√		√	√	√	√			

FACULTY CO-ORDINATORS
(Dr. P. Rani, ASP/Maths)

HOD
Dr. P S Satheesh Kumar

IQAC

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
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