VELAMMAL
COLLEGE OF ENGINEERING AND TECHNOLOGY
MADURAI – 625 009.
(AUTONOMOUS)

Title: Smart Grid and Deregulated Energy Market
Date : 06.10.2023
Duration : 2 hour
Activity Category: Self Driven
Theme: Design thinking

Outcome:

About the Expert :

Dr.B. Shakila obtained her B.E. Degree with First Class in Electrical and Electronics Engineering from Kamaraj college of Engg and Technology affiliated to Anna University, Chennai, in the year 2009. and She has completed her Master Degree in Power Systems Engineering from Kalasalingam University, Tamilnadu, India in the year 2012. She has secured gold medal during PG studies. She was awarded doctoral degree (Ph.D in electrical and electronics engineering) in the year 2018 from National Institute of Technology Nagaland. She is working as Assistant Professor in the department of Electrical and Electronics Engineering, National Institute of Technology Nagaland, India, since 2013. Her areas of research interest include smart grid security, renewable energy systems and machine learning. She is a life time member of ISTE and IIM. She also has industrial experience at Infosys, Mysore.

Target Audience : II year EEE

SMART GRID definition, EXISTING GRID VS SMART GRID – comparison, CONCEPTUAL SMART GRID FRAMEWORK (IEC) , Smart Metering, Conventional Vs Contemporary Energy Meters, Need for Smart Metering Infrastructure - Key Factors, Components Of Smart Metering, Functional Block Diagram of Smart Metering, Smart metering communications & protocols, Smart metering isalled capcity in India, advantages and short falls.

Faculty:10 Students:60

VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY,
(Autonomous)
(Accredited by NBA and NAAC with 'A' Grade)
Madurai-625 009, Tamil Nadu.
Department of
Electrical and Electronics Engineering
&
IE(I) Students Chapter

Organizes

Guest Lecture on

Smart Grid and Deregulated Energy Market

Date: 06.10.2023 **Time: 09.30 am to 10.30 am**

Resource Person

Dr. B. Shakila

Assistant professor (Grade I)/EEE
National Institute of Technology,
Nagaland.

Chief Patron
Shri.M.V.Muthuramalingam
Chairman, VCET.

Patrons
Dr.N.Suresh Kumar
Senior Principal, VCET.

Dr.P.Alli,
Principal, VCET.

Convener
Dr.R.Narmatha Banu,
Professor & Head/EEE

Coordinator
Dr.N.Karpagam, Professor/EEE
IE (I) students chapter Incharge

Mode of conduct: Google Meet Platform

Velammal College of Engineering &Technology
(Autonomous)
(Accredited by NAAC with 'A' Grade and by NBA for 5 UG Programmes)
(Approved by AICTE and affiliated to Anna University,Chennai)
Velammal Nagar, Madurai – Rameswaram High Road
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Dr.R.Narmatha Banu, M.E., Ph.D..
Professor & HoD/EEE

Phone: 0452 – 2465289, Fax: 0452 - 2465285
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01.10.2023

To

Dr.B.Shakila,

Assistant Professor (Grade 1) / EEE,

National Institute of Technology,

Nagaland.

Sub: Invitation to deliver a guest lecture under IE(I) student chapter -Reg

Respected Madam,

We are very much pleasure to inform you that our IE(I) student chapter is organizing various programs for our students. In this series, we are happy to invite you as a expert to deliver a lecture in the topic in the field of power system which will be an exposure to our students in the recent developments like smart grid and IoT based power system operation. The lecture is scheduled on 06.10.2023 Please accept our invitation and explore the recent techniques to our students.

Thank you

Place: Madurai

Date: 01.10.23.

With warm regards,

01/10/23

Dr.R.Narmatha Banu

Dr.R.NARMATHA BANU
Professor & Head
Department of Electrical and Electronics Engineering
Velammal College of Engineering and Technology
Velammal Nagar, Viraganoor, Madurai-625 009

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10.10.2023

Appreciation letter

To

Dr.B.Shakila,

Assistant Professor (Grade 1) / EEE,

National Institute of Technology,

Nagaland.

Respected Madam,

We are very much glad to appreciate you for accepting our invitation to deliver the lecture under IE(I) student chapter for our students on 06.10.2023 in the topic of Smart Grid and Deregulated Energy Market. We are very much pleasure to inform that your guidance given to the students was very useful. We thank you once again and wish you all success in your future endeavor.

Thank you

With warm regards,

10/10/23

Dr.R.Narmatha Banu

Dr.R.NARMATHA BANU
Professor & Head
Department of Electrical and Electronics Engineering
Velammal College of Engineering and Technology
Velammal Nagar, Viraganoor, Madurai-625 009

JP TRANSFORMERS

A SUMMER INTERN REPORT

Submitted by

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AGANSHA M-21EEE02

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In partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

Electrical and Electronics Engineering

Of

Velammal College of Engineering and Technology
(Autonomous), Madurai -625009

JUNE 2023

REPORT OUTLINE

- **Title page**
- **Certificate from the Company**
- **Bonofide from Academic Mentor and HoD**
- **Acknowledgements**
- **Abstract**
- **List of Contents**
- **List of Figures**
- **List of Tables**
- **Chapter I - Introduction**
- **Chapter II – About the Company**
- **Chapter III – Internship Overview**
- **Chapter IV – Conclusions and Outcome**
- **References**

BONOFIDE CERTIFICATE

Certified that the students ABILASHINI M – (913121105001) AGANSHA M – (913121105002) AKSSHAYASRI K – (913121105004) CHANTANAA SRI T S – (913121105009) DIVYA DHARSHINI M – (913121105012) RAMYA R – (913121105039) SABARIDEVI G – (913121105041) VASUNTHRA D – (913121105054) WAJEEHA S – (913121105058) YOGALAKSHIMI A S - (913121105059), Completed summer internship 2023 at JP Transformers under my supervision.

SIGNATURE

Dr.R.Narmatha Banu.

(HEAD OF THE DEPARTMENT)

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Madurai – 625009

SIGNATURE.

Dr.N.Karpagam

(ASSISTANT PROFESSOR I)

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ACKNOWLEDGEMENT

First of all we thank the Almighty for strengthening us throughout the project and complete it successfully.

we find immense pleasure to convey our sincere thanks to our honorable principle Dr.P.Alli, for providing necessary facilities in carrying out our summer internship.

We would like to express our hearty thanks to our Head of the Department **Dr.R.NarmathaBanu,M.E.,Ph.D.,** for her constant encouragement.

We take this opportunity to express our sincere and heartful thanks to our guide, **Dr.N.Karpagam,M.E.,Ph.D.,** for her patience in guiding, technical and moral support and immense part of her dedication in completing the summer internship successfully.

We also thank our Class Advisor **Dr.S.Dhanalakshmi M.E.,Ph.D.,** for encouraging us to do the internship**.**

We express our special thanks to other staff members of our department, and teaching staff who assisted us, by their support and encouragement.

We also express our special thanks to the JP Transformers who allowed us to do the internship in their company and guiding us to complete this summer internship successfully.

ABSTRACT

This report presents a summary of activities we were involved in during an internship at JP TRANSFORMERS from June 26/06/2023 to July 08/07/2023. The activities that we were involved in included but are not limited to sampling as well as analyzing the working of transformer. At the beginning of internship we had several queries in our mind regarding the different activities,technologies used in JP TRANSFOMERS and what skill is needed in that organization. During the internship several queries are cleared by during some activities. We gained new knowledge and skills and met many new people. We achieved many of our learning goals.Working together with the different background peoples and by education these threats have to be approached to succeed in our internship the sharing of knowledge,ideas and opinion is of importance. All in all, this industrial training has given us the valuable insight of being a Professional engineer.

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CHAPTER 1

INTRODUCTION

1.1 LEARNING OBJECTIVES

Internship is to achieve knowledge in the practical field of an organization in order to make theoretical knowledge to be more fruitful. Motives of internship are:

- To increase the value of theoretical knowledge.
- To get practical knowledge about the institution.
- To remove the limitations of theoretical knowledge.
- To innovate new techniques of management.
- T expand the span of knowledge.
- To suggest some measures for the improvement of the profitability position of an organization.
- To know how to solve managerial problems.
- To implement the knowledge of practical training in the practical life.

1.2 ABOUT

- JP Transformers is one of the leading electrical transformers manufacturers in Madurai, Tamil Nadu.
- Established in the year 2016.
- The Plant and Machineries have been fully installed to manufacture power transformer and distribution transformers in the range of 11KV, 22KV,33KV voltage level…

  Capacity upot16KVA,25KVA,63KVA,100KVA,200KVA,250KVA,315KVA, 415KVA,500KVA,1000KVA,5000KVA Transformer.
- Customer Satisfaction is the ultimate goal of our company.
- Committed to provide products at the right time at the right place with zero tolerance.

1.3 SPECIAL FEATURES

- Very less prices compared to other competitive companies.
- Faster response.
- Very impressive customer list.
- Filter machine here filter the 6000 litre of Transformer Oil per hour, so the usage of DG is reduced.

- 24*7 hours servicing for emergency break down or other necessary work.
- NABL Calibrated testing kit.
- Assist and contribute to the team.
- Performing clerical duties like creating PPT, drafting reports etc.,
- Managing social media and emails.
- Event Handling.
- Learning and gaining experience.
- Brushing up on soft skills.
- Picking up hard skills.
- Job Shadowing.
- Forming a peer support group.
- Building strong bonds with bosses and coworkers.
- Making a career call.
- Research.

1.5 BRIEF DETAILS OF WHOLE INTERNSHIP

TRANSFORMERS

Transformer is a device that transfers electric energy from one circuit to another circuit without changing the frequency with 98% of efficiency. Transformers can be step -up and step down. A transformer that increase the voltage from primary to secondary (more secondary winding turns) than the primary winding is called step-up transformer.

Conversely a transformer designed to do just the opposite is called step-down transformer.

TYPES OF SERVICE TRANSFORMERS IS CLASSIFIED:

- Distribution transformer
- Power transformer
- Instrument transformers
  - Current transformer
  - Potential transformer
  - Auto transformer
- Isolation transformer

GENERATION SIDE TRANSFORMER:

- Solar

- Wind
- Tidal
- Nuclear

A transformer or electrical transformer is a static AC electrical machine which changes the level of alternating voltage or alternating current without changing in the frequency of supply
A typical transformer consists of two windings namely primary winding and secondary. These two windings are inter-linked by a common magnetic circuit for transferring electrical energy between them.

PRINCIPLE OF TRANSFORMERS:

The principle of the transformers is mutual inductance, which states that when a changing magnetic field of an coil links to another coil , an EMF is induced in the coil.

CONSTRUCTION OF TRANSFORMERS:

- Conservator tank
- Buchholz relay
- Radiator fin
- Primary winding
- Secondary winding
- Core
- Insulator / bushing
- Explosion Vent
- Breather
- Oil gauge
- Main tank

Usually electrical power is generated is at 11kv. But there are 11kv,22kv and 33kv machines available. For economical reasons AC power is transmitted at very high voltages say 220 v or 440v over long distances .
Now for the safety reasons the voltages is stepped down to different levels by step down

transformers at various substations to feed the power to the different locations and thus the utilization of power is done at 400/230v.

Construction and size of the transfers varies with respect to the rated voltages. Materials used for the winding varies according to the application of transformers. The materials used are copper and aluminium. Mostly copper is used in the 33kv and 22kv transformers. Core of the transformers are silica-steel. Now a days core is made up of gun metal (CGO).

TRANSFORMER WORKING:

Basically, a transformer consists of 3 parts. They include an iron core which provides a circuit of low reluctance for magnetic lines of force ,a primary winding which receives a electrical energy from a source and a secondary winding which receives electrical energy from the primary coil.

Normally, we observe in the industry, the primary winding is the coil that draws power from the source. The secondary winding is the coil that delivers the energy at the transformed or changed voltage to the load. Usually, these two coil are subdivided into several coils in order to reduce the creation of flux. The two windings are inductively linked. If suppose the transformers is the step up transformer, secondary winding is the HV winding and the primary winding is the LV winding. In the step down transformer, secondary winding is the LV winding and the primary winding is the HV winding. Deoending on the application we can step up and step down the transformer.

In the primary winding and the secondary winding the leatheroid paper is used for insulation. The secondary winding side has the star connection . In star connection ,we observed that 3 terminals are connected to neutral. If suppose one winding side is connected to the phase then it will become short circuited and fault.

The primary winding side has the delta connection. In this winding , the R phase is connected to Y. Y phase is connected to B and B phase is connected to R.

The transformer has the 11KVA then the thickness of primary winding has 16kg and the transformer has the 63KV then the thickness of primary winding has 18kg. The current rating increases ,then the thickness of primary winding is decreases.

From the industry, we observed that in the 11KVA transformer has 1turn has 44 times. If the KVA is increases, then the turn will be double. For example, 22KVA then the turn will be 88 times to be wound.

PRIMARY WINDING:

Since the primary winding is connected star fashion. Therefore, the primary line voltage is equal to the root 3 times of the primary phase voltage and the primary line current is same as the primary phase current.

SECONDARY WINDING:

The secondary winding is connected in delta manner. Therefore, on the secondary side of the transformer , the line voltage will be the same as the phase voltage whereas the line current is root 3 times of the phase current.

STAR-DELTA CONNECTION:

In case of the star -delta connection , the secondary phase voltages lead the primary phase voltages by +30 degree and this is also the phase relationship between the respective line voltages.

ADVANTAGES OF STAR -DELTA CONNECTION IN THE TRANSFORMER:

1.As the primary is star connected, hence the neutral is available on the primary side, which can be grounded to avoid the distortion in voltage.
2.The star-delta connection is free from the problem of the third harmonics, as they circulate in the delta loop on the secondary winding.
3.The star -delta connected transformers can handle large unbalanced loads.
4.Since the primary winding is star connected, it requires less number of turns. This makes the star-delta connection economical for large high voltage step-down transformer.

DISADVANTAGES OF THE STAR -DELTA CONNECTION IN THE TRANSFORMER:

1.The main disadvantages of the star-delta connected transformer is that it cannot be paralled with the star-star or delta-delta connected transformer because the secondary voltage is shifted by 30 degree with respect to the primary voltage.

APPLICATION OF THE STAR-DELTA CONNECTION THE TRANSFORMER:

1.This type of connection is used , where the primary side requires neutral terminal so that it can be grounded.
2.The star-delta connection is mainly used in step-down transformers, which are located at

DISMANTLING OF TRANSFORMER:

Dismantling of transformer is done to recycle the damaged parts of a transformer.

PROCESS:

At first,the lid has to be removed.The lid is made up of steel and fixed with bolts or welded to steel walls of transformer.

To remove the lid,welded part has to be cut without letting any sparks go into the transformer which can set oil inside to fire.

Tests are carried out to find the damages in the transformer.

Oil is drained out from the transformer.

The damaged part is separated from the transformer.

The damaged part is replaced with newly manufactured part.

The manufactured part is assembled in the transformer.

CAUSES FOR DAMAGE OF TRANSFORMER:

Lightning

Falling of trees

Loose connections

Insulation failure

FIG 1.1 DISMANTELING THE TRANSFORMER

ASSEMBLING OF TRANSFORMER:

The parts of transformer which are removed for recycling is assembled in the transformer.This process is known as assembling of transformer.

PROCESS:

At first,core is set.

The core is in the form of thin sheets.

Primary and secondary winding coils are made using copper/aluminium.

The wounded coils are placed carefully in the assembled core.

Insulations are given wherever they are required using leather oil paper.

The core bolt and rods are fixed in position.

The primary and secondary windings are connected as per the requirement.

The complete assembly is kept in the Hot air chamber and a high temperature is maintained to prevent any moisture in core coil assembly.

After a certain time,the complete assembly is taken out of the chamber and placed inside the tank.

The bushings and tap switches are fitted in the tank.

The oil is filled and the cover is placed on the tank frame and bolted.

Next step is to paint the transformer.

Two coats of anticorrosive and two coats of enamel paint are painted on the outside of the tank.

The inner portion of tank is painted with varnish.

The last step is to test the tansformers.

GENERATION SIDE OF TRANSFORMER:

They allow for power to be generated (generators), transformed from one voltage level to another (transformers), transmitted from one location to another (transmission lines), distributed among a number of transmission lines and power transformers (busses), and used by consumers (loads).

Transformers can decrease or increase the voltage, sometimes known as stepping down or stepping up the voltage. Using a transformer can help make the right power accessible to us when we need it

A transformer is a device that transfers electric energy from one alternating-current circuit to one or more other circuits, either increasing (stepping up) or reducing (stepping down) the voltage.

FUNCTIONS:

A power generation plant is a facility designed to produce electric energy from another form of energy, such as: Heat (thermal) energy generated from: fossil fuels; coal.

Power generating systems are generally treated as heat engines to convert heat input into work, hence to produce electricity at a sustained rate. Heat input is supplied by burning fossil fuels (coal, oil and natural) and biomass, or processing nuclear fuel, or harvesting thermal energy from renewable energy sources.

Electric generator, any machine that converts mechanical energy to electricity for transmission and distribution over power lines to domestic, commercial, and industrial customers.

SPECIFICATIONS:

Generator transformers must have a rating of at least 0.85 power factor lagging or

FIG.1.2:DISTRIBUTION SIDE TRANSFORMER

0.95 power-factor leading. An HV voltage of 400 kV or higher is required.For an effective system, the impedance must be lower.Low loss and low flux density design

The flux density at any point of the magnetic circuit when the transformer is connected on the centre tap and operating at normal voltage and frequency shall not exceed 1.65 Tesla. Saturation must not occur at 10 % over voltage.

PURPOSES:

Transformers are found everywhere Alternating Current (AC) electrical energy is used. A transformer is an electrical device that trades voltage for current in a circuit, while not affecting the total electrical power. This means it takes high-voltage electricity with a small current and changes it into low-voltage electricity with a large current, or vice versa. One thing to know about transformers is that they only work for Alternating Current (AC), such as you get from your wall plugs, not Direct Current (DC).

DISTRIBUTION SIDE OF TRANSFORMER:

A distribution transformer or service transformer is a transformer that provides the final voltage transformation in the electric power distribution system, stepping down the voltage used in the distribution lines to the level used by the customer.

The distribution transformer is responsible for outputting the correct voltage. It converts the voltage from the transmission lines and delivers it for domestic or industrial usage.

A transformer is a device that transfers electric energy from one alternating-current circuit to one or more other circuits, either increasing (stepping up) or reducing (stepping down) the voltage.

FUNCTIONS:

A distribution transformer is the type of transformer that performs the last voltage transformation in a distribution grid. It converts the voltage used in the transmission lines to one suitable for household and commercial use, typically down to 240 volts.

A distribution transformer or service transformer is a transformer that provides the final voltage transformation in the electric power distribution system, stepping down the voltage used in the distribution lines to the level used by the customer.

By accurately capturing unique data at the distribution transformer, DTM devices provide necessary reconciliation points between the substation and endpoint meters, thus enabling utility operators to effectively detect power diversion occurring in front of the endpoint meter.

SPECIFICATIONS:

FIG.1.3:TRANSMISSION LINES AND PHASE DIVISION OF DISTRIBUTION SIDE TRANSFORMER.

The continuous rating of the distribution Transformers shall be 100kVA, 250 kVA, 400 kVA and 630 kVA. Each Transformer shall be capable of supplying its rated power being the product of rated voltage and rated current on the line side winding (at center tap) expressed in kVA, as defined in IEC

The efficiency of the transformer is maximum at 50% of full load. A transformer has mainly two types of losses, these are, iron losses and copper losses. Iron loss, which is also referred as core loss, consists of hysteresis loss and eddy current loss.

PURPOSES:

A distribution transformer provides the final voltage transformation in the electric power distribution system, stepping down or up the voltage used in the distribution lines to the level used by the customer in their home, businesses, and commercial building A distribution transformer is the type of transformer that performs the last voltage transformation in a distribution grid.

TRANSFORMER OIL FILTRATION:

Transformer oil filtration is a process through which sludge, dissolved moisture, and gasses are removed to secure the oil’s quality and performance. Transformer oil is susceptible

to degradation as time advances since it is exposed to acid, dust, and moisture.

WHAT ARE THE TYPES OF TRANSFORMER OIL:

Transformer insulating oil may be paraffin-based or naphtha based. Paraffin-based oil is obtained from crude containing n-paraffin which is less oxidized than naphtha-based paraffin. Ee-based oil, on the other hand, contains less amount of n-paraffin.

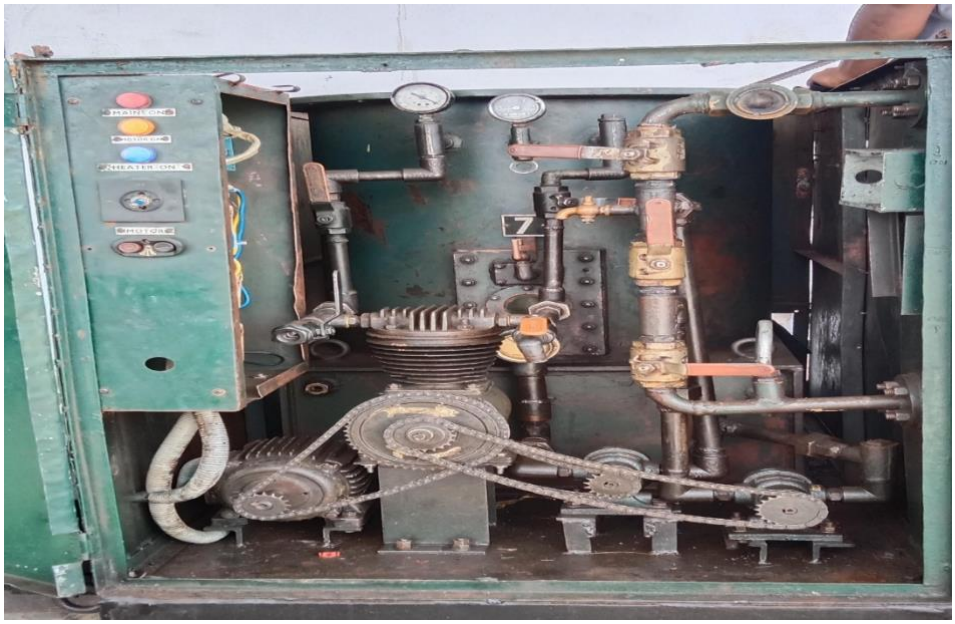

FIG.1.4: TRANSFORMER OIL FILTERATION MACHINE

TRANSFORMER OIL TREATMENT:

Transformer oil treatment plants are classified based on filtration systems, treatment methods include filtration, purification and regeneration which is also known as reclamation. Based on end use, transformer oil is treated in different methods for utility, method and other requirements.

OIL FILTRATION METHOD:

The temperature increases to more than 65 degrees celsius, whose latent heat separates moisture and gasses. This classifies oil viscosity and facilitates the separation process. Following this, sludge and dirt are removed by employing filter candles either as edge filter or depth filters. Filter cartridges and edge-type paper filters are also used for the purpose.

TESTING OF TRANSFORMERS:

S.C TEST IN TRANSFORMER

1. **Breakdown voltage Test**
2. **Insulation resistance Test**
3. **Back to back Test**

BREAK DOWN VOLTAGE TEST

In order to conduct a short-circuit test, the secondary side is shorted, and the primary current is adjusted to the normal full-load level.

BDV test means the Breakdown Voltage Test. This test is performed for verifying the dielectric strength of the oil of the transformer. Dielectric Strength is the maximum capacity to resist the voltage of insulating oil. This test demonstrates the dielectric Strength of Transformer Oil.

A sample of the insulating oil is taken from the drain valve of the transformer and its breakdown voltage is measured. A test voltage is applied to the electrodes immersed in the insulating oil and is gradually increased up to the breakdown voltage with a constant, standard-compliant slew rate e.g. 2kV/s.

As per IEC, the minimum BDV value of transformer oil should be 30 KV at.2.5 mm gap.

The Breakdown voltage after oil filtration treatment should be a minimum 70 KV at a 2.5 mm gap.

PURPOSE OF BDV TEST

- □To predict RLA or residual life analysis of transformer
- □Increase operation safety
- □Increase transformer reliability

INSULATION RESISTANCE TEST

IR tests are performed to test the integrity of the winding insulation but at very high voltages. And, for this reason, its important to follow the safety guidelines at all times when conducting this test.

Insulation resistance tests are made to determine insulation resistance from individual windings to ground or between individual windings. Insulation resistance tests are commonly measured directly in mega ohms or may be calculated from measurements of applied voltage and leakage current.

The recommended practice in measuring insulation resistance is to always ground the tank (and the core). Short circuit each winding of the transformer at the bushing terminals. Resistance measurements are then made between each winding and all other windings grounded.

Transformer windings are never left floating for insulation resistance measurements. Solidly grounded winding must have the ground removed in order to measure the insulation resistance of the winding grounded. If the ground cannot be removed, as in the case of some windings with solidly grounded neutrals, the insulation resistance of the winding cannot be measured. Treat it as part of the grounded section of the circuit.

We need to test winding to winding and winding to ground (E).For three phase transformers, We need to test winding (L1,L2,L3) with substitute Earthing for Delta transformer or winding (L1,L2,L3) with earthing (E) and neutral (N) for wye transformers.

3. BACK-TO-BACK TEST

Sumpner's Test or Back-To-Back Test on Transformer for Efficiency, Voltage Regulation, & Heating Effect

The *open-circuit test and short circuit* test are performed to determine the equivalent circuit parameter. With the help of these tests, we cannot find the temperature rise in a *transformer*. Because the open-circuit test is examined only core loss and short-circuit test is examined only copper loss. However, the transformer is not subjected concurrently to both losses. Hence, the alternative is Sumpner's test.

The solution to this problem is the Sumpner's test. The Sumpner's test is performed to determine the *transformer efficiency* *voltage regulation*, and heating effect of the transformer under loading conditions. The **Sumpner's test** is also known as the **back-to-back test** as this test consists of two identical transformers connected back-to-back.

In Sumpner's test, actual loading conditions are simulated without connecting actual load. For a small transformer, it is convenient to connect full-load. But it is difficult to connect full-load in the case of large transformers. Therefore, this test helps to find the important parameters of the transformer. And the Sumpner's test gives more accurate results compared to open-circuit and short-circuit tests.

WINDING RESISTANCE TEST:

Winding resistance test can be done during periodic maintenance. winding resistance test is performed at the installation site in order to check for abnormalities due to loose connections, broken strands of conductor etc. This test can be done to both Star and Delta connection.

In Star connection to check winding resistance, testing kit is placed across R and Neutral. This can be done to other two phase.

In Delta connection phase to phase resistance can be found out and individual resistance can be calculated. Formula to get R phase, R phase resistance= Y phase resistance*1.5.

The main purpose of winding resistance test is to determine the following:

- Calculation of the I^2R losses in transformer.
- Calculation of winding temperature at the end of temperature rise test of transformer.
- As a benchmark for assessing possible damages in the field.

The transformer winding resistances can be measured by current voltage method. In this method of measurement of winding resistance, the test current is injected to the winding and corresponding voltage drop across the winding is measured. The testing times have been greatly reduced by using modern microprocessor-based test instruments.

Direct readings are available from digital meters with automatic indications

showing when a good measurement is available. On some testers, two measurement channels are available allowing for two resistance measurements at the same time.

VOLTAGE RATIO TEST:

The performance of a transformer depends on turns or Voltage ratio of transformer. **Transformer ratio test** can also be performed by portable transformer turns ratio (TTR) meter. They have an in built power supply, with the voltages commonly used being very low, such as 8-10 V and 50 Hz.

1.First,the tap changer of transformer is kept in the lowest position and LV terminals are kept open.

2. apply 3-phase 415 V supply on HV terminals. Measure the voltages applied on each phase (Phase-phase) on HV and induced voltages at LV terminals simultaneously.

3. After measuring the voltages at HV and LV terminals, the tap changer of transformer should be raised by one position and repeat test.

4. the same for each of the tap position separately.

VECTOR GROUP/POLARITY TEST:

Vector Group test is main criterion for operation of Transformer. It is important to carry out vector group tests of the transformer at the factory site for ensuring the customer specified vector group of transformers. Two major instruments required to conduct this test is Ratio meter and Voltmeter. Procedure for vector group test is as follows

- The primary and secondary windings are connected together at one point.
- Connect the neutral point of the star connected winding with the earth.
- A low-voltage three-phase supply (415 V) is then applied to the HV terminals.
- Voltage measurements are then taken between various pairs of terminals as indicated in the diagram and the readings obtained should be the phasor sum of the separate voltages of each winding under consideration.

OPEN CIRCUIT TEST (OC):

Open circuit test on a transformer is performed to determine No load loss and No

load current. This test results the iron losses and no load current values, thereby we can determine the no load branch parameters with simple calculations.As the name itself indicates, secondary side load terminals of the transformer are kept open and the input voltage is applied on the primary side. Since this test is carried out without placing any load, this test is also named as No Load Test. Procedure to conduct OC test is as follows

- The open circuit (OC) test Is carried out by connecting LV side (as primary) of the transformer to the AC supply through ammeter, voltmeter and wattmeter instruments.
- The secondary side or HV side terminals are left open and in some cases a voltmeter is connected across it to measure the secondary voltage.
- The primary side voltmeter reads the applied voltage to the transformer, ammeter reads the no load current, wattmeter gives the input power and the variac used to vary the voltage applied to transformer.
- When a single phase supply is given to the transformer, the rated value of the primary voltage is adjusted by varying the variac. At this rated voltage, the ammeter and wattmeter readings are to be taken.

When the transformer is operating on no load, the current drawn by the shunt or parallel parameters is very small, about 2 to 5 percent of the rated current. Thus, a low current will flow through the circuit during OC test. In order to be readable by the instruments, the measurements of voltage, current and power must be performed in the low voltage side. And also, low range current coils and low range ammeter must be selected. The power factor of the transformer on no load is too low.

COOLING OF TRANSFORMER :

It is the process by which heat generated in the transformer is removed to the efficiency of the transformer. In transformer Oil Natural Air Natural(ONAN) is widely used

TYPES OF COOLING :

ONAN - Oil Natural Air Natura

ONAF - Oil Natural Air Forced

OFAF – Oil Forced Air Forced

OFWF – Oil Forced Water Forced

KVA RATING :

The KVA unit represents kilovolt amperes.KVA rating is given for transformer because core loss is directly proportional to voltage,copper loss is directly proportional to current and it is independent of power factor.

IMPEDANCE :

Transformer impedance is resistance and reactance that hinder alternating current in a transformer. Expressed as Percentage. The percentage of impedance voltage when the transformer is running at full load.

VECTOR GROUP :

A Vector group is the international electrotechnical commission (IEC) method of categorizing the high voltage (HV) winding and low voltage (LV) winding configurations of three phase transformers.The vector group designation and the difference in phase angle between them.

NAME PLATE DETAILS :

WIND TRANSFORMER :

STANDARD	: IS-2020	FREQUENCY (HZ)	: 50
KVA	: 315	TYPE OF COOLING	: ONAN
VOLTS AT NO: LOAD HV	: 33000	VECTOR GROUP	: DYN 11

VOLTS AT NO LOAD LV : 415		MASS OF OIL (KG)	: 600
AMPERES HV	: 5.5	TOTAL MASS (KG)	: 1900
AMPERES LV	: 438.2	VOL OF OIL (LIT)	: 640
IMPED VOLT %	: 4.85%	MONTH & YEAR OF MFG	: 2007
CUSTOMER	: PIONNER WINCON		
ORDER NUMBER	: 0708230 DT D.11.07		

TABLE 1.1 NAME PLATE DETAILS OF WIND TRANSFORMER

OFF CIRCUIT TAP CHANGER		NO = LOAD	
SWITCH POSITION	CONNECTION	HV	LV
1	7.8		
2	8.6		
3	8.9		
4	9.6		
5	8.19	33000 KV – 415 V	
6	18.4		
7	4.11		
8	11.3		
9	8.12		

TABLE 1.2: TAP CHANGER POSITION

MARSHALLING BOX:

The Marshalling box is the master control panel for protection devices. This panel comes with a see - through glass door to allow easy visibility of the instruments and their readings .The panel is situated next to the transformer.

It contains OTI or oil temperature indicator ,WTI or winding temperature indicator, heater switch ,pump control switch ,fan cooler control, mcb and contractors.

These panels are used in substation switchyards provided with

Terminal Blocks to which control cables are connected.

These are used for large rating and they are given tag of number to the transformer and they are given to the control room and if the fault occurs then it will be indicated and we can identify the particular place of fault.

Marshalling box is needed to eliminate all external connections from the transformer to external switchgear or panel.

With a use of tube printer naming of the relay wires and alarm wires in the transformer are named and the same number is given to control panel of the substation .

FIG1.5:MARSHALL BOX

Star connection is given to the secondary winding cause the need of neutral.

If the load is given a phase and neutral ,it will give high efficiency.

If the load is given a phase and earth , it will give low efficiency.

FIG.1.6:MARSHALL BOX

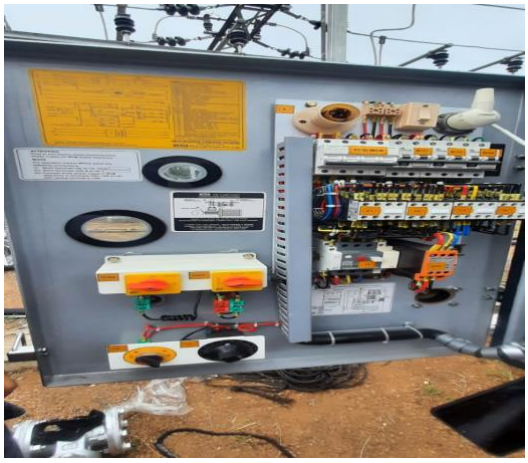

FIG.1.7:MOTOR COMPARTMENT

ONSITE:

On the 8th day of our internship, we all visited the koodalnagar EB substation for the erection of new transformer of higher efficiency than the existing transformer for the output of 110kv.We gained more practical knowledge there by observing the erection process like how the parts of the transformer are arranged and combined. Also we were glad to have a discussion of how the EB bills works, the monitoring system works and types of breaking

FIG.1.7:ERECTION OF NEW TRANSFORMER IN KOODALNAGAR EB SUBSTATION

We also visited the control panel and have the idea about the Marshall box and the connectivity between the transformer wiring and the panel wirings and there also the alarming system for the emergency situations like temperature rising within the transformer, ON and OFF of the cooling system and learn about the most important relays.

There we come to know about the diagrams that are drawn to represent the substation connections and there is the backup room in the substation of DC supply in which the number of 2v 120Ah C10 batteries are connected in series which is used for the backup of the transformer.

FIG.1.8:BATTERY BACKUP OF KOODALNAGAR SUBSTATION

There are the Tapings and voltage ratio in that always 5th tap is the normal in which the 11kv is attained if we want to vary the voltage we have to change the number of taping.

TAP NO.	1	2	3	4	5	6	7	8	9	10	11A	11B	11C	12	13	14	15	16	17	18	19	20	21
VOLTAGE IN VOLTS ON 110KV SIDE	116500	114125	112750	111375	110000	108625	107250	105875	104500	103125	101750	101750	101750	100375	99000	97625	96250	94875	93500	92125	90750	89375	88000

FIG.1.9: TAP CHANGING POSTIONS AND THEIR VOLTAGES

For changing the tapings number there is a motor which is running to maintain and vary the tapings accordingly. This is works on the bearings of two in which the motor rotates to turn the vertical gear bearing to turn the required taping.

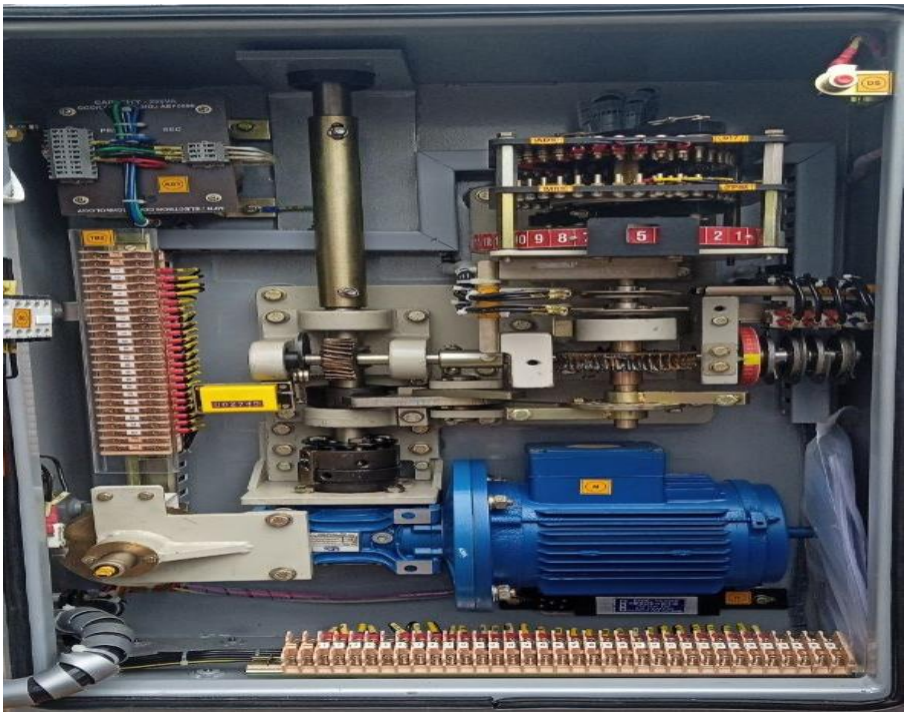

FIG.1.10:DC MOTOR FOR TAP CHANGING IN THE TRANSFORMER

The transformer is of ON load and OFF load in which the new erection transformer is ON load transformer hence we learned the relays and motor drive control scheme .

We also learned about the OLTC test and grounding technique employed in the site and about the naming the wires that in the transformer to the substation.

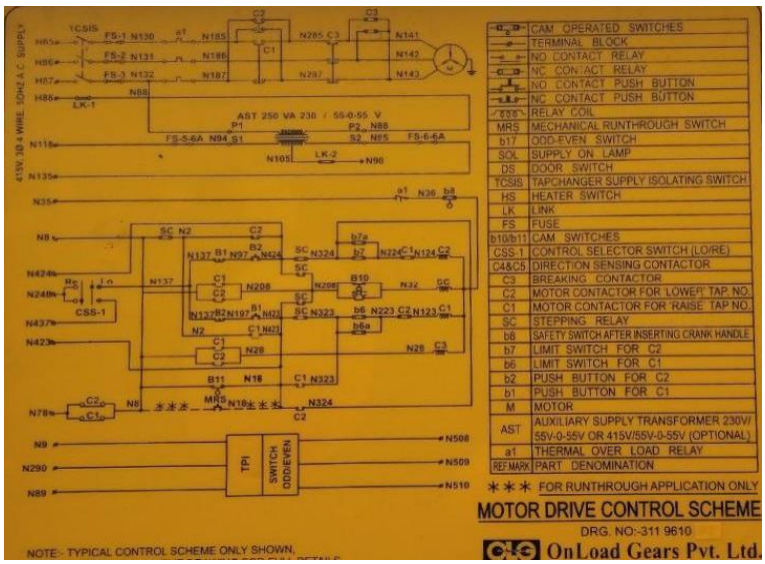

FIG.1.11:DC MOTOR NAME PLATE

ONLOAD GEARS PRIVATE LIMITED

OLTC TEST CERTIFICATE

OLGQA/F.08/E

OLTC Sl.No : P0407

Customer : Venkateswara Electrical Industries Private Limited

Customer Reference : VEI/368/2021-22

OLG W.O.NO : TPL298

A:ON-LOAD TAP CHANGER RATING:

Type : RMV III 200 D-110/68-12.21.2O

Rated Voltage : 110.00 kv

Current : 200 A

Transition Resistance Ohmic value : 15.20 Ohms/Phase

Measured Value : 'U' Phase: 15.2/15.2 'V' Phase: 15.2/15.2 'W' Phase: 15.2/15.3 Ohms

Gen.Arrgt.Drg : 2400270/R4

Schematic Diagram : 2171010/R4

Driver Motor : 415V

Specification to which tested IS 5468/IEC 60214-1

Serial No : P04

Phase : III P

Frequency : 50H

Step Voltage : 16

Connection Diagram : 34

Control Circuit Voltage : 11

Phase : III P

B:TRANSFORMER DETAILS:

Rated Voltage : 110/0.0 kV

Rated Current : 60.6061 A

Step Voltage :

C:TEST FOR ON-LOAD TAP-CHANGER & MOTOR DRIVE(As Per IEC 60214-1)

1.MECHANICAL TEST: The tap-changer fully assembled with motor drive TEN complete cycle of operation were performed satisfa

any sign of failure.

2.SEQUENCE TEST: During the mutine mechanical test sequence of operation of selector switch contact was recorded oscillograph

switching time recorded was 48.68 milliseconds which is within the acceptable range.

3.PRESSURE TEST:

a) OLTCs 10PSI(0.7 Kg/sq cm) for 8 hrs with hot oil at 80 Degree C.

Clause 5.3.4 : Result : No leakage was found during test.

4.VACUUM TEST - vacuum level of 6x10-5 bar & Helium Spary.

Clause 5.3.4 : Result : No deformation was found during test. No leakage was found.

5.SPECIAL TEST - GAS TIGHTNESS - The Cylinder was subjected to 10PSI of Helium gas for 1 Hour.

Result : No leakage was identified.

6.AUXILIARY CIRCUIT INSULATION TEST: A test voltage of 2kV,50HZ was applied for one minute between live terminals of

circuits and the earth terminal on the housing. The test was performed satisfactorily with out any sign of failure.

Clause 5.3.3

7.SPECIAL TEST CONTACT RESISTANCE - < 2 ho/ms

Result : Found within the limit

Date: 20-Apr-2023

AUTHORI

FIG.1.12:OLTC TEST CERTIFICAT

FIG.1.13: GROUNDING

FIG.1.14:NAMING OF THE WIRES IN THE MARSHALL BOX

Finally we learnt about the entry process that is recorded each one or two hours of intervals and also other for every 12 hours for the daily usage of current and power factors, loads, temperature of oil in °c, bus voltage ,room temperature and calculate the units consumed by the 11kv feeders under the koodalnagar EB substation .

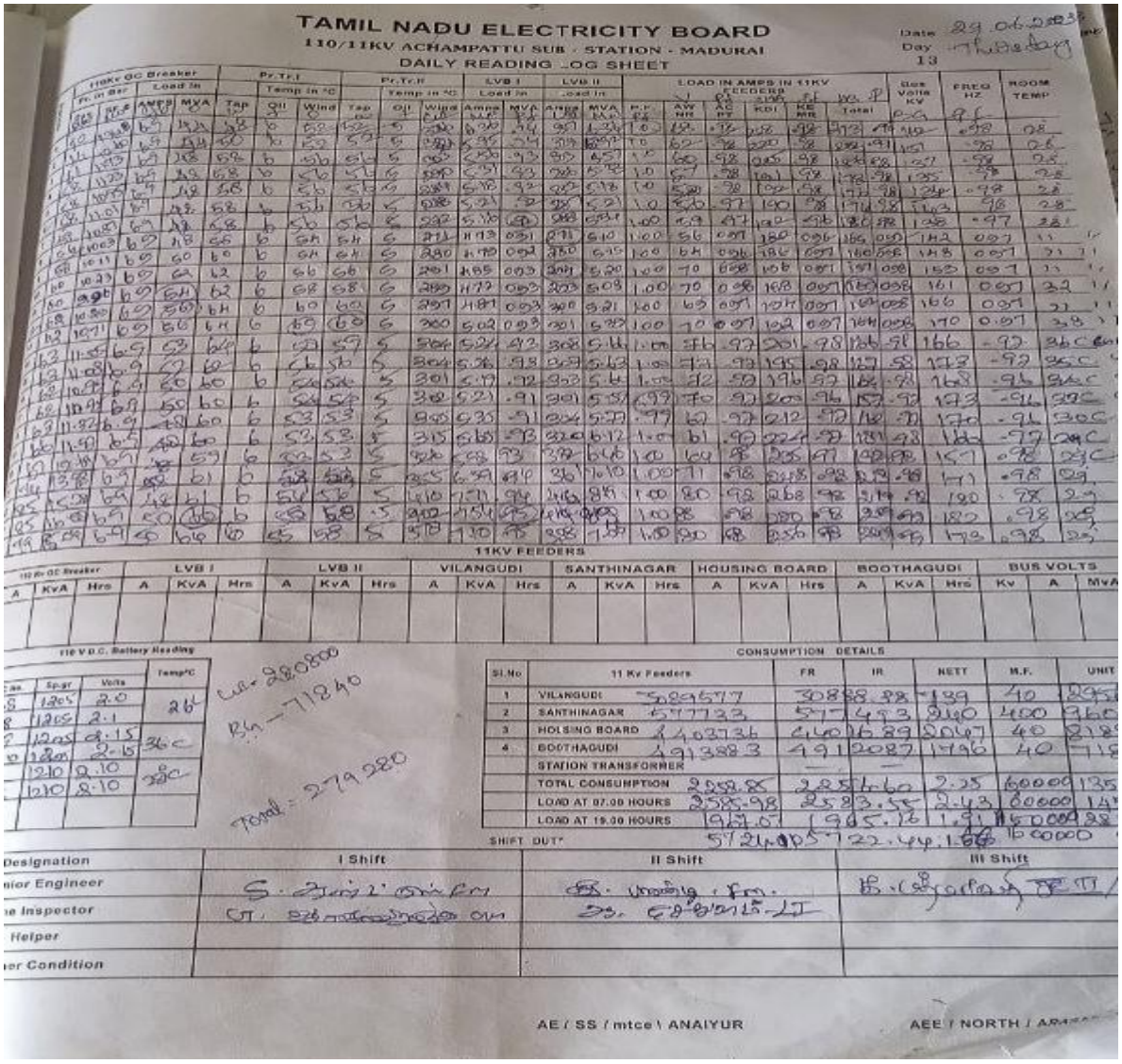

FIG.1.15:REGISTER BOOK IN KOODALNAGAR EB SUBSTATION

Hering EOK series ensures that the transformer's insulating fluids function in optimal operating points, thereby asserting high performance of the apparatus. Supported by German engineering, Hering offers the EOK series which is a benchmark in oil purification and degasification technology that removes most volatile acids.

CHAPTER II
ABOUT THE COMPANY

NATURE OF ORGANISATION :

The Plant & Machineries have been fully Installed to Manufacture Power Transformer & Distribution Transformers in the range of 11 KV, 22 KV, 33 KV Voltage Level, Capacity upto 16 KVA, 25 KVA, 63 KVA, 100 KVA, 200 KVA, 250 KVA, 315 KVA, 415 KVA, 500 KVA, 1000 KVA, 2000 KVA, 5000 KVA Transformer

This Company Having Registered as Small Scale Industries in Tamil Nadu Govt We Only Use Standard Quality of Goods & Materials, Where Main Raw Materials Such as C.R.G.O, Insulating Paper and Transformer Oil are Obtained From the Leading Importers From Across the Country.

Partners of the Firm Having a 27 Years of Experience in Power & Distribution Transformer Manufacturing. Partners of the Firm Having a 15 Years Experience in the Erection Work & Transporting of Power Transformers Upto 55 MVA & 110 KV Voltage Level.

BUISNESS TYPE :

Service based business are available in this company we done intern in service based.In service based they provide all types of services like

- Transformer Rewinding
- Transformer Testing
- Power Transformer Erection
- Distribution Transformer Manufacturing
- Transformer Oil Leak Arresting

- Transformer Oil Filtration and Services
- All Kind of Breaker Testing
- All Kind of Protection Relay Testing

SPECIAL FEAUTRES OF THIS FIRM :

- Very Less Prices Compare to Other Competitive Companies.
- Faster Deliveries & Excellent Service.
- Faster Response.
- NABL Calibrated Testing Kit.
- When Their Transformer Fails due to any reason to Minimise Losses to the firm due to Transformer Failure.In this Cases We Offer Various Rating of Transformers on Rent Untill the failed Transformer get Repaired.
- Work Completed with in the Time Limit.
- 24x7 Hours Servicing for Emergency Break Down or Other Necessary Work.

COMPANY'S VISION & MISSION :

We are Committed to Provide Our Products at the Right Time at the Right Place with Zero Tolerence.

CHAPTER-III

INTERNSHIP OVERVIEW

In the duration of the intern we were all given various duties and responsibilities assigned like Observations were made and implementation of the dismantling and organizing the transformer and understanding the what type of damage was caused and where were the parts damaged ,also if we could use it by means of several ways of testing it and also the use of the name plate details.

3.1WEEKLY ACTIVITY REPORT:

Title of Summer Internship:-

Date FROM 26/6/23 TO 8/7/23.

Date and day	Time	Tasks assigned	Tasks completed	Observations
26/6/23 Monday To 1/7/23 Saturday	10.00 a.m To 5.00 p.m	To observe the transformer name plate details and the dismantling of the transformer.	Observed the name plate details and learn about the new things in it and dismantled the transformer and identification of damaged part prior with the testing .	We observed the different types of tests done in the transformer of utilization side and power giving side and analysed which part of the transformer is damaged and restore it in the possible

				ways
3/7/23 Monday To 8/7/23 Saturday	10.00 a.m To 5.00 p.m	To Separate the secondary coil from the insulation medium and recoil it and to observe the erection process in koodalnagar EB substation.	The secondary coil is replaced and the damaged transformer is got ready and the oil purification is done and filled in the transformer and we learned the erection process that has been done in the substation and also the connections done in there from the transformer to the control panel.	We all visited and observed the erection done in the substation and also the works done by the employees like how they are all maintaining the transformer and more about the relays and alarm systems that control panel had.

REMARKS OF THE INDUSTRY GUIDE:

The industry guide is very friendly with us and clarify all the doubts that were being raised by us and also taught so many useful things in our stream.

3.2 CONTRIBUTIONS OF THE INTERN TO THE ORGANIZATION:

□ we take the initiative to learn new things within the industry and also our responsibilities are new like learning the things like dismantling each part and to identify the damages using the tests .

□We have accomplished more than 3 tasks that are assigned to us like ,we had done the testing and identified the damaged coil and refurbished it.

□we learned new concepts based on the insulation materials used and what are all their grade and in which we have to use it .

□ For us the major involvement in the industry was,
visited the EB substation with the employees and learn and do about the erection of the new transformer and how they are replacing it with the old version and like how they are maintaining it.

KNOWLEDGE GAINED FROM INTERNSHIP:

TECHNICAL OUTCOMES:

The knowledge we received here has made us more confident technically.

Knowledge we gained related to testing, winding ,heating and designing was truly helpful.

NON-TECHNICAL OUTCOMES:

1. How to put knowledge and skill into practice .
2. Self discipline
3. The benefits of networking.
4. Understanding the workplace
5. Enthusiasm is invaluable
6. How important good communication
7. The benefits of taking on feedback.

The overall experience has made us learn many professional ethics such as time management, regularity in work, Consistency in performance, improvisation in our problem analysis.

OBJECTIVES :

- To become acquainted with the future field of the electrical engineering student
- To apply the acquired knowledge and skills in a practical situation .
- To become acquainted with real life problem solving
- To work independently
- To learn how to plan things out carefully
- To practice oral and written skills
- To develop social and communicative skills
- To carry out a project which is useful for the employer

WIND TRANSFORMER

FIG.1.17:WIND TRANSFORMER

ERECTION OF TRANSFORMER

FIG.1.18:ERECTION

FIG.1.19: PRIMARY WINDINGS

FIG.1.20: SECONDARY WINDINGS

TRANSFORMER DISMANTLING

FIG.1.21:DISMANTLING

RECOILING OF LV WINDING OF TRANSFORMER

FIG.1.22: RECOILING OF LV WINDING

DISMANTLING OF TRANSFORMER

CHAPTER 4

CONCLUSION

The training at manufacturing of transformer company was very helpful to us. It has improved my theoretical concept of transformer. We also know that a transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors. A varying current in the first or primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic field through the secondary winding. This varying magneticfield induces a varying electromotive force (EMF) or "voltage" in the secondary winding. This effect is called inductive. The training was more than hope to me and also help me to understand about manufacturing of transformer more.

Our overall experience at "JP Transformer" was just phenomenal and with guides like you both made it more knowledgeable and useful.

The experience and the knowledge we have gained here has made us more confident to take up the concepts of transformers as our PROJECT interest.

We learnt to emerge as one of the finest technical and electrical engineer of higher learning to develop engineering professional who are technically competent, ethical and environmental friendly for betterment of society and to accomplished stimulating learning environment through high quality internship innovation and industry institute interface.

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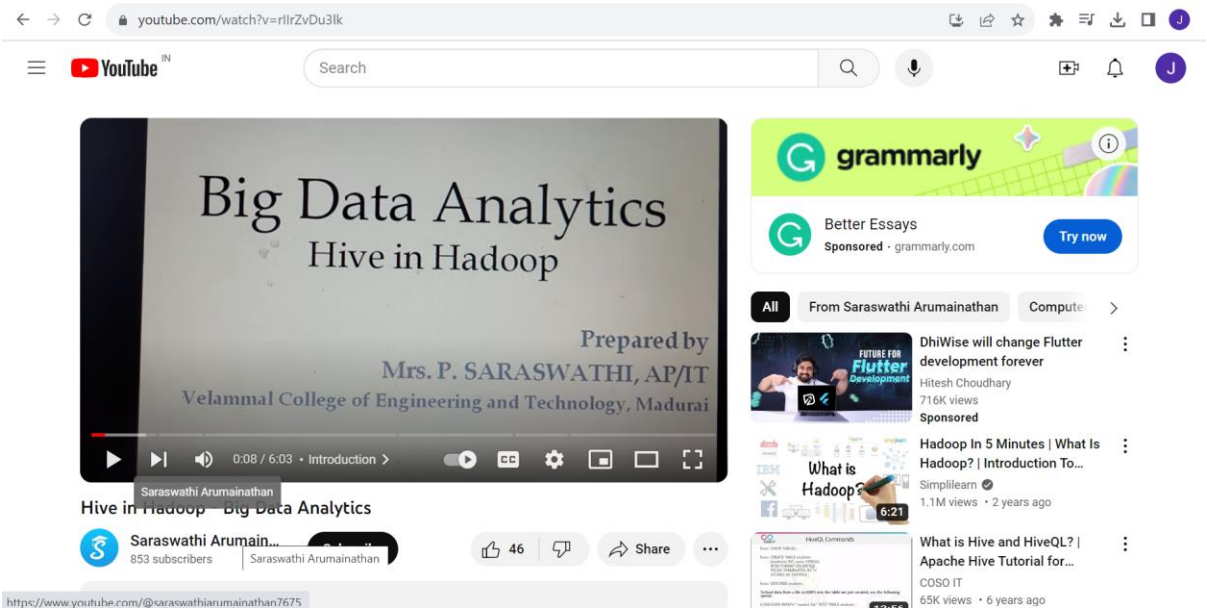
- Name Plate Details of Transformer, https://youtu.be/mI00xByUIqk,youtube
- K.R.M.Nair,Power and Distribution Transformers.In this book we can get to gain knowledge about Distribution of Transformer.(86-140)
- Vector group test, ScheneiderElectric,https://www.se.com/eg/en/faqs/FA3383/
- Testing of Transformer oil https://en.m.wikipedia.org/wiki/Transformer_oil_testing.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Prepared by
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Velammal College of Engineering and Technology, Madurai
0:08 / 6:03 • Introduction
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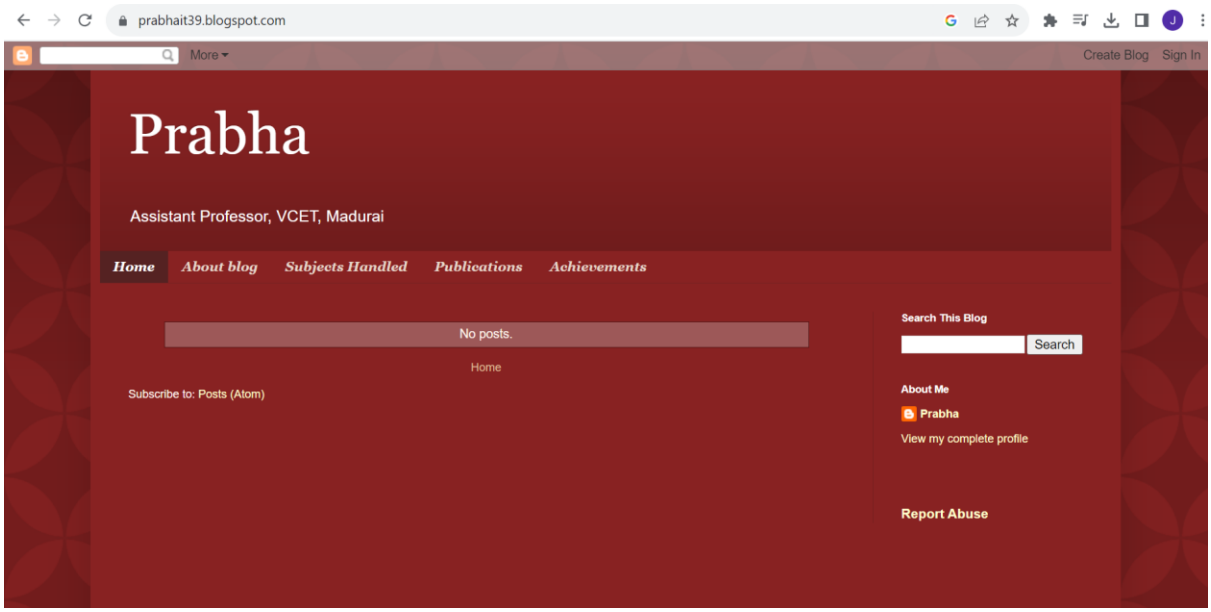
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Department of Computer Science and Engineering

REPORT Date:17.09.2022

PEDAGOGY DAY **Academic Year : 2022-2023**

Subject handler Name		J.Shanthalakshmi Revathy	
Subject Code/ Name		**MG8591/Principles of Management**	
Batch	2021-2025	Year/ Sem/ Sec	IV/VII/A
Topic Covered		Planning Tools and Techniques	
Innovative Method / ICT tool Used		**Incidental Learning**	
Student Present /Total		58/64	
Student Absent / Total		6/64	
Feedback(Pros/Cons)		Pros: Students enjoyed it and they came forward to participate. They understood SWOT analysis well.	

Proofs : Photos attached

Course Incharge HOD / CSE

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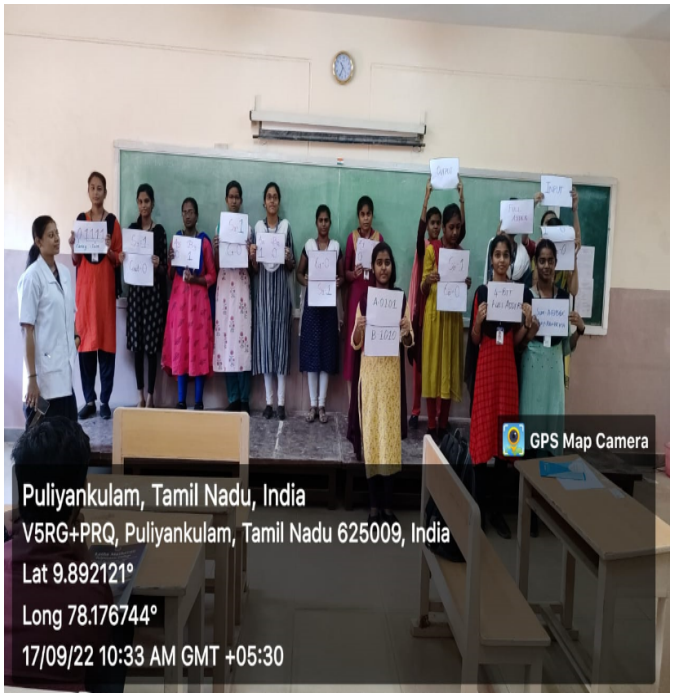
REPORT Date:17.09.2022

PEDAGOGY DAY **Academic Year : 2022-2023**

Subject handler Name		Mrs.Kavitha S	
Subject Code/ Name		21EC201-Digital Principles and System Design	
Batch	2021-2025	Year/ Sem/ Sec	II/III/A
Topic Covered		Binary Parallel Adder(N-Bit Parallel Adder)	
Innovative Method / ICT tool Used		Role play	
Student Present /Total		53/64	
Student Absent / Total		11/64	
Feedback(Pros/Cons)		Pros: Students enjoyed and they understood how the movement of bits will be in full adder.	

Proofs : Photos attached



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REPORT Date: 17.09.22

PEDAGOGY DAY **Academic Year: 2022-2023**

Subject handler Name		Mrs.C.B.Selva Lakshmi	
Subject Code/ Name		CS8592-OOAD	
Batch	CSE	Year/ Sem/ Sec	III/V/B
Topic Covered		UML Diagrams	
Innovative Method / ICT tool Used		Scenario Based Learning (Treasure Hunt)	
Student Present /Total		53//60	
Student Absent / Total		07/60	
Feedback(Pros/Cons)		Scenario-based learning promoted active participation, which in turn leads to deeper learning of students. The activity encouraged the students to interact and helped them know the concept in depth .	

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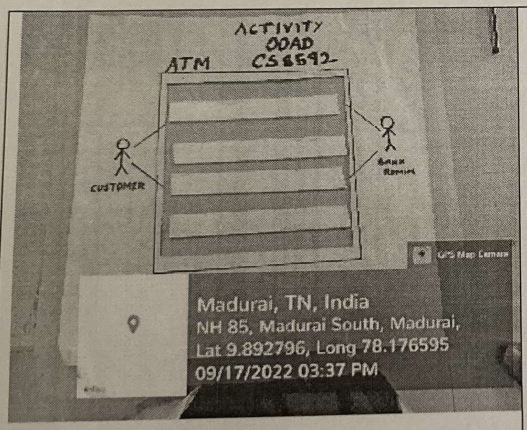

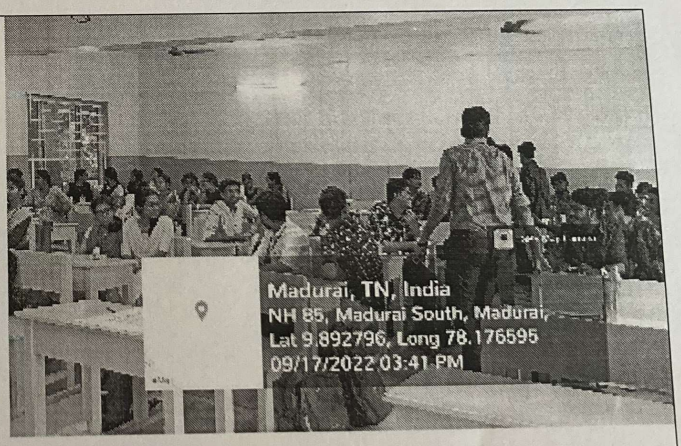

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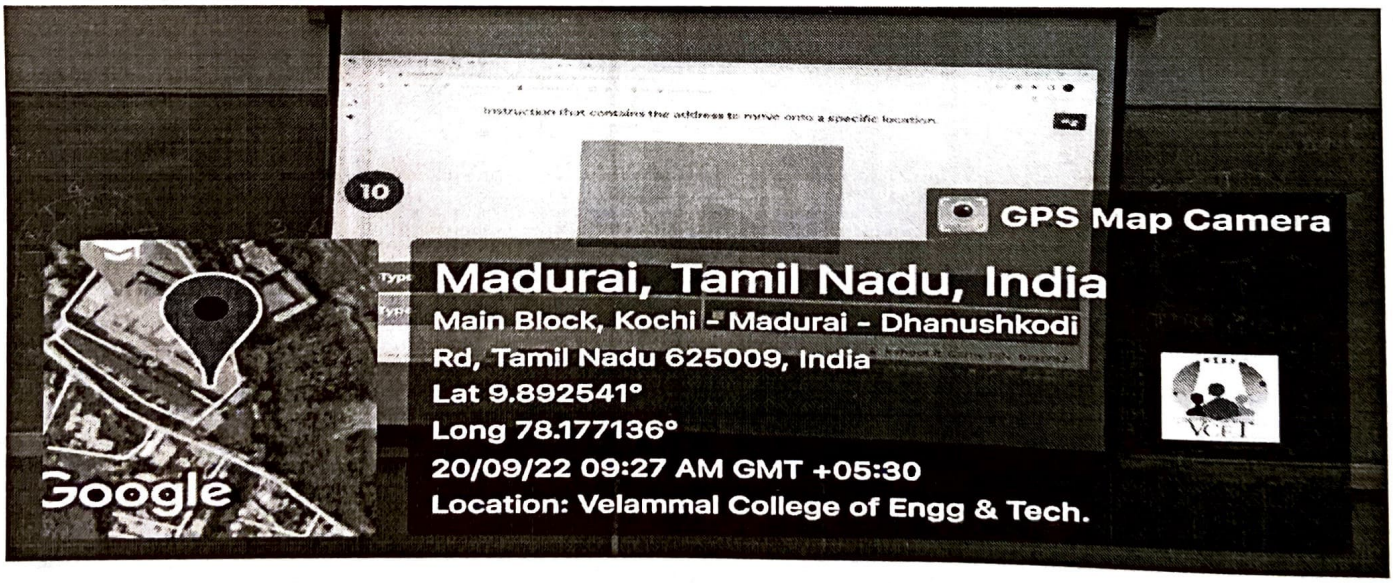
PEDAGOGY DAY 20-09-2022 **Academic Year : 2022-2023**

Subject handler Name		Mrs.P.R.Hemalatha	
Subject Code/ Name		21CS201/ Computer Organization & Architecture	
Batch	CSE	Year/ Sem/ Sec	II / III / B
Topic Covered		Basic Organization of Computer & Arithmetic unit	
Innovative Method / ICT tool Used		Quiz / Kahoot Online Quiz platform	
Student Present /Total		61	
Student Absent / Total		05	
Feedback(Pros/Cons)		Pros : The quiz was very entertaining and fun filled and it was refreshing. Cons : The time can be extended.	



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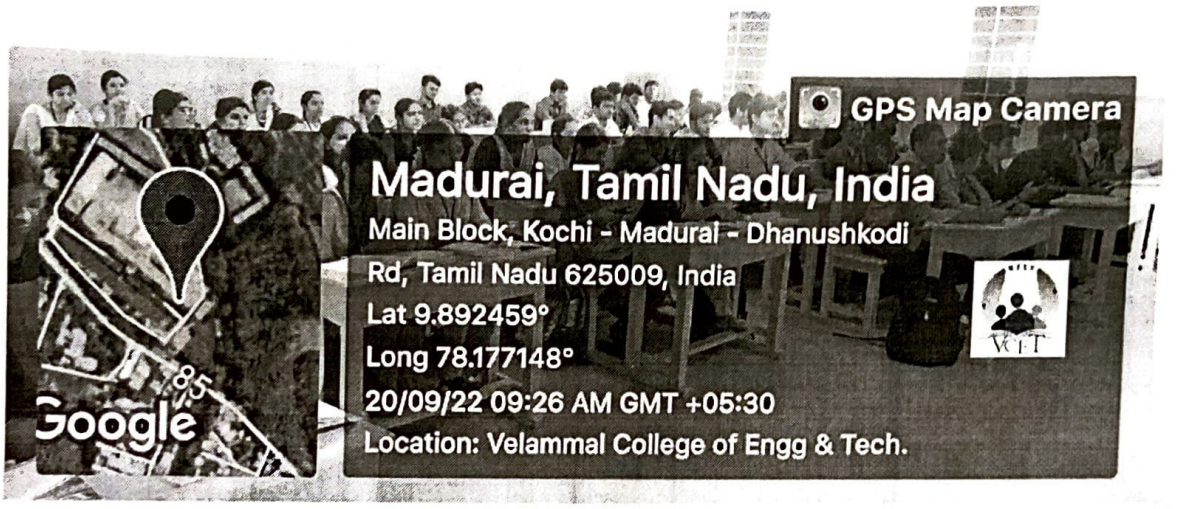

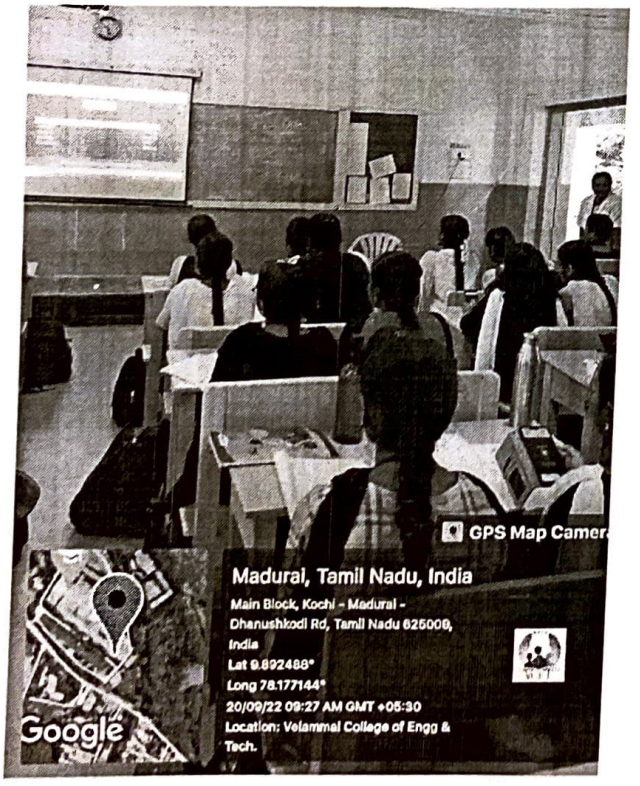

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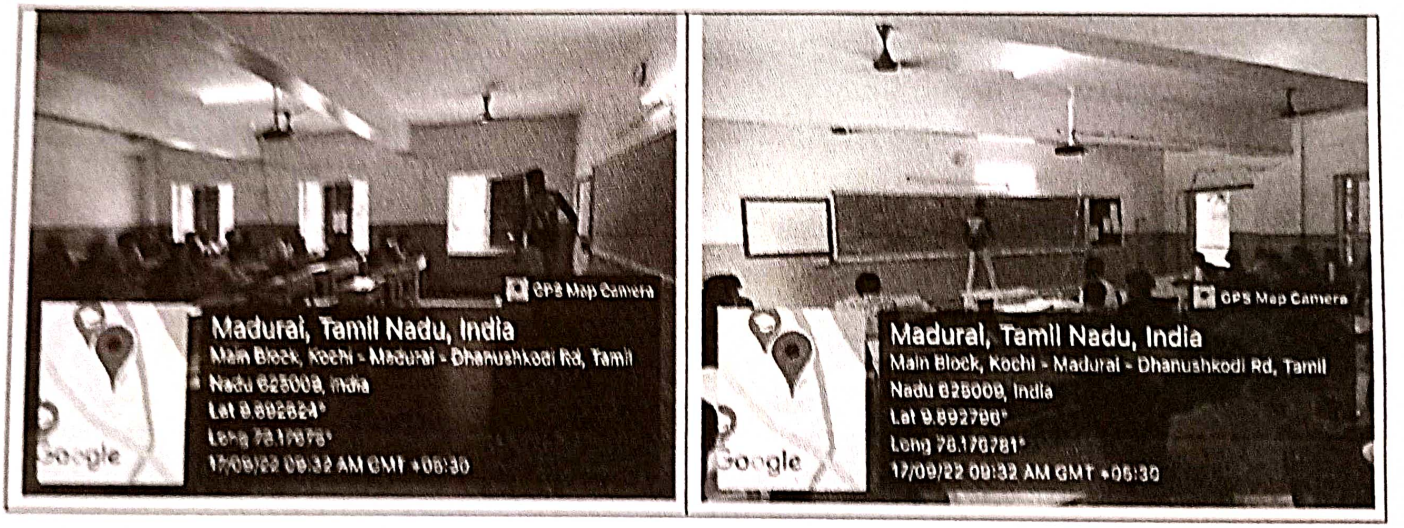
PEDAGOGY DAY (17.09.22) **Academic Year : 2022-2023**

Subject handler Name		Dr.R.Vijayalakshmi	
Subject Code/ Name		OEC552 /Geographical Information Systems	
Batch	2020-2024	Year/ Sem/ Sec	III / V / A
Topic Covered		GIS Softwares	
Innovative Method / ICT tool Used		Inquiry Based Learning	
Student Present /Total		55/60	
Student Absent / Total		5/60	
Feedback(Pros/Cons)		Inquiry-based learning is a learning process that engages students by making real-world connections through exploration and high-level questioning. It was very useful for understanding the GIS softwares	

Proofs : Photos should be attached here.



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Department of Computer Science and Engineering

REPORT Date: 17.09.2022

PEDAGOGY DAY (17.09.2022) **Academic Year : 2022-2023**

Subject handler Name		Mr. S. Murali	
Subject Code/ Name		EC8691/ Microprocessors and Microcontrollers	
Batch	2020-24	Year/ Sem/ Sec	III/V/A
Topic Covered		Data Transfer by DMA Controller	
Innovative Method / ICT tool Used		Role Play	
Student Present /Total		48	
Student Absent / Total		13	
Feedback(Pros/Cons)		* Easy to Understand * Eager to participate * Fun filled but technical i.e. subject related only	

Proofs : Photos should be attached here.

Photo 1	Photo 2
	

Course In charge HOD / CSE

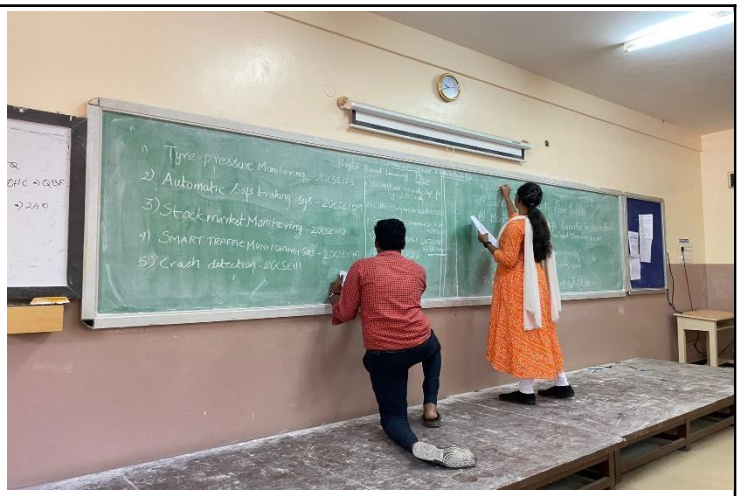
VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY,
MADURAI- 09.
(An Autonomous Institution)
Department of Computer Science and Engineering

REPORT Date:17.09.2022

PEDAGOGY DAY (17.09.2022) **Academic Year : 2022-2023**

Subject handler Name		Dr. S. Ponmalar	
Subject Code/ Name		EC8391 – Microprocessors and Microcontrollers	
Batch	2020 -2024	Year/ Sem/ Sec	III/IV / B
Topic Covered		Projects on Microprocessors and Microcontrollers	
Innovative Method / ICT tool Used		Project Based Learning / Brainstorming	
Student Present /Total		54/60	
Student Absent / Total		6/60	
Feedback(Pros/Cons)		• Brainstorming session ignited the minds of the students to think widely. • Students were open to discuss about different problems around the society. • Identified the problem and formation of groups to work together	

Proofs : Photos should be attached here.



VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY,
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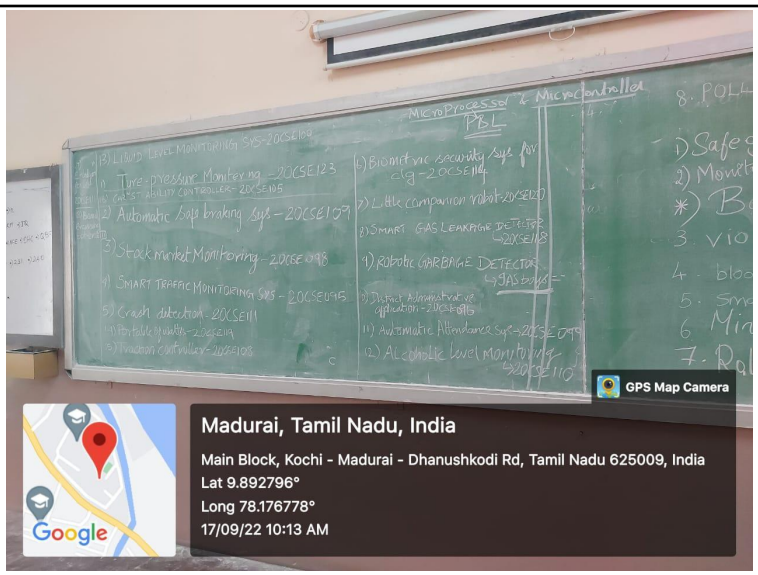
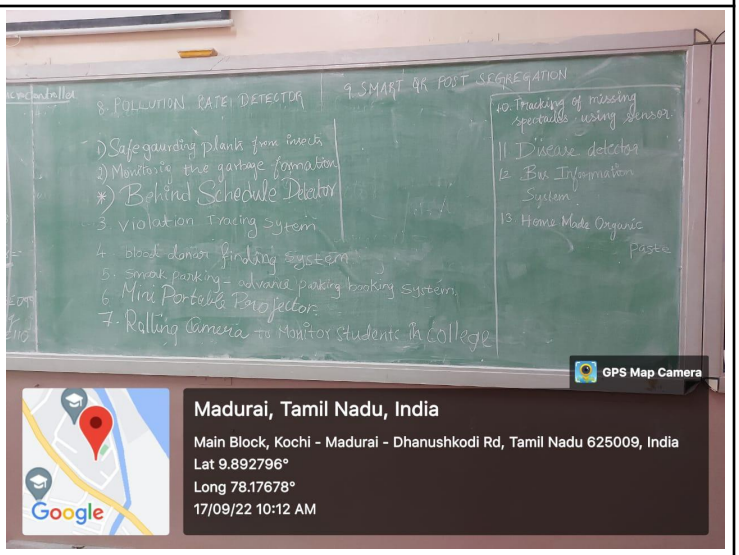
(An Autonomous Institution)
Department of Computer Science and Engineering





Course Incharge **HOD / CSE**

Dr. S. Ponmalar

Velammal College of Engineering and Technology, Madurai – 625 009
(An Autonomous Institution)

Department of Computer Science and Engineering

REPORT Date: 31-10-2022

PEDAGOGY DAY: 29-10-2022 **Academic Year: 2022-2023**

Subject handler Name		Dr. A.M.Rajeswari	
Subject Code/ Name		21CS203 / Object Oriented Programming	
Batch	2021-2025	Year / Sem / Sec	II / III / A
Topic Covered		Lab Exercises: Inheritance, Interface, Package, Multi Threading, File I/O	
Innovative Method / ICT tool Used		Interactive and Peer Discussion - Issues raised by one team and solution given by other teams.	
Student Present /Total		56/65	
Student Absent / Total		09/65	
Feedback (Pros/Cons)		Pros: Majority students actively participated. Cons: No sufficient time.	

Proofs : Photos should be attached here.

31/10/22
Course In-charge

31/10/22
HOD / CSE

Velammal College of Engineering and Technology, Madurai – 625 009
(An Autonomous Institution)

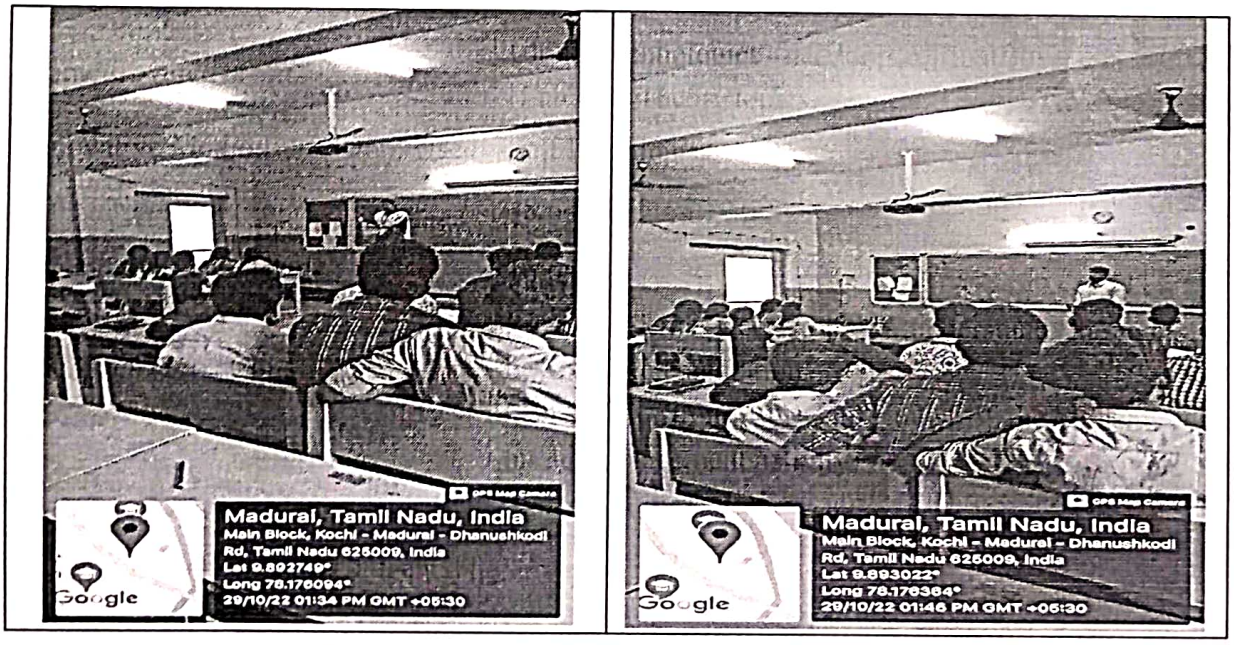
Department of Computer Science and Engineering

REPORT Date: 31-10-2022

PEDAGOGY DAY: 29-10-2022 **Academic Year: 2022-2023**

Subject handler Name		Dr. A.M.Rajeswari	
Subject Code/ Name		CS8791 - CLOUD COMPUTING	
Batch	2019-2023	Year/ Sem/ Sec	IV / VII / B
Topic Covered		Cloud Technologies – Hadoop, VirtualBox (Lab cum Theory topics)	
Innovative Method / ICT tool Used		Self Learning - Seminar	
Student Present /Total		48/64	
Student Absent / Total		16/64	
Feedback (Pros/Cons)		Pros: Students were able to understand the concepts beyond implementation. Cons: Low strength, because most of the students were on duty (placement activity)	

Proofs : Photos should be attached here.



31/10/22

Course In-charge

31/10/2022

HOD / CSE

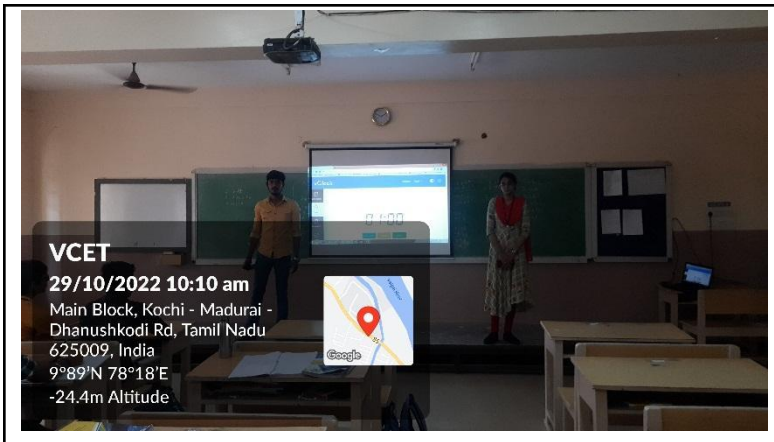
VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY,
MADURAI- 09.
(An Autonomous Institution)
Department of Computer Science and Engineering

REPORT Date:29.10.2022

PEDAGOGY DAY (29.10.2022) **Academic Year : 2022-2023**

Subject handler Name		Mr.KR.Senthil Murugan	
Subject Code/ Name		CS928 – Computer Networks	
Batch	2020 -2024	Year/ Sem/ Sec	III/V / B
Topic Covered		Network Layer and Applications of Computer Networks	
Innovative Method / ICT tool Used		Online Quiz Tool and Counting Timer	
Student Present /Total		50/60	
Student Absent / Total		10/60	
Feedback		• Team Quiz contest session was interesting and useful to know about the new technologies of network concepts. • Students were open to discuss about different kind of logical and physical linking between devices. • This pedagogy session was vibrant and students were able to find the latest technologies in computer networks.	

Proofs : Photos should be attached here.



VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY,
MADURAI- 09.
(An Autonomous Institution)
Department of Computer Science and Engineering

Course Incharge

Mr.KR.Senthil Murugan

HOD / CSE

VELAMMAL COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS), MADURAI-625 009
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
2022-2023 - EVEN SEMESTER

COURSE PLAN

Degree	B.E-ECE
Course Code/Title	21EC208/ Microprocessors and Microcontrollers
Batch	2021-2025
Year/Semester/section	II/IV/B
Course Component	Professional core
Name of the Instructor	Dr.S.Gandhimathi @ Usha

Session No.	Topic to be covered	Applications / Examples	Text/Reference Book Page No.	Mode of Delivery	Teaching Aid	No. of Hours	Cumulative No. of Hours
UNIT I : ARCHITECTURE OF 8086 & ASSEMBLY LANGUAGE PROGRAMMING							
1	Microprocessor Families 8086 –Architecture	Automated Electronic Appliances	T1(2.11-2.15)	L + D	BB,LCD	1	1
2	Instruction set		R4(203-234)	L + D	BB,LCD	2	3
3	Addressing Modes		R4(187-196)	L + D	BB,LCD	3	6
4	Bus Cycles		R4(35-36)	L + D	BB,LCD	1	7
5	Assembly Language Programming of 8086	Arithmetic and Logical instructions Based ALP's	R4(232-233)	L + D	BB,LCD	2	9
6	Assembler Directives		R4(197-201)	L + D	BB,LCD	1	10
7	Interrupts and its applications		T1(8.1-8.12)	L + D	BB	2	12
UNIT II : PERIPHERAL INTERFACING							
8	External Memory Interface		R4(230-248)	L + D	BB,LCD	2	14
9	Programmable Peripheral Interface (8255)	Traffic light controller	R4(249-251)	L + D	BB,LCD	2	16
10	Serial Communication Interface (8251)	Parallel and serial port	R4(252-259)	L + D	BB,LCD	2	18
11	Keyboard and Display Interface (8279)	Matrix Keypad , Alphanumeric display interface	R4(281-289)	L + D	BB,LCD	1	19
12	Programmable Timer Controller (8253/8254)		R4(313-335)	L + D	BB,LCD	1	20

Session No.	Topic to be covered	Applications / Examples	Text/Reference Book Page No.	Mode of Delivery	Teaching Aid	No. of Hours	Cumulative No. of Hours
13	Programmable interrupt controller (8259)		R4(278-285)	L + D	BB,LCD	1	21
UNIT III : 8051 MICROCONTROLLER							
16	8051 Microcontroller		T2(23-28)	L + D	BB,LCD	1	23
17	Instruction Set		R4(213-220)	L + D	BB,LCD	2	25
18	Assembly Language Programming	Arithmetic and Logical instructions Based ALP's	T2(37-44)	L + D	BB,LCD	2	27
19	I/O Interfacing .8051 Timers		T2(239-260)	L + D	BB,LCD	2	29
20	USART , Interrupts		T2(261-270)	L + D	BB,LCD	2	31
21	8051 Programming in C		T2(181-209)	L + D	BB	2	33
UNIT IV : MSP430 MICROCONTROLLER							
22	Architecture Introduction		T3(119-124)	L + D	BB,LCD	2	35
23	Embedded C Programming in MSP430		T3(185-187)	L + D	BB,LCD	2	37
24	GPIO Pins & Configuration		T3(190-197)	L + D	BB,LCD	3	40
25	Timers, Capture & PWM		T3(275-351)	L + D	BB,LCD	2	42
26	DAC – ADC Ports - I^2C		T3(369-432) T3(542-567)	L + D	BB	2	44
UNIT V: SYSTEM DESIGN USING MICROCONTROLLERS							
27	ADC & DAC Interfacing	Measurement of Physical Parameters	T2(374-402)	L + D	BB,LCD	1	45
28	Sensor Interfacing		T2(403-410)	L + D	BB,LCD	2	47
29	RTC Interfacing (DS1307) using I^2C Standard		T2(4678-479)	L + D	BB,LCD	2	49
30	Relay, Motor Control – DC & Stepper Motor		T2(491-521)	L + D	BB,LCD	2	51
31	System Design: Traffic Light Controller & Digital Weighing Machine.		R4(521-528)	L + D	BB,LCD	1	52

ASSIGNMENT:

1. Write 8086 Assembly Language Programs for various Arithmetic, Logic, Relational operations and String manipulations.
2. Write 8051 Assembly Language Programs for various Arithmetic, Logic, Relational operations.
3. Mini Project.

TEXT BOOK(S):

T1: Douglas V Hall, "Microprocessors and Interfacing", 3rd Edition, McGraw Hill Education, 2012.
T2: Muhammad Ali Mazidi, "The 8051 Microcontroller and Embedded Systems using Assembly and C", 2nd Edition, Pearson India, 2007.
T3: John H. Davies, "MSP430 Microcontroller Basics", 2nd Edition, Newnes, 2008.

REFERENCES:

R1: V. A.K. Ray and K.M. Burchandi, "Intel Microprocessors Architecture Programming and Interfacing", McGraw Hill, 2000.
R2: Sunil Mathur, "Microprocessor 8086: Architecture, Programming and Interfacing", PHI Learning Pvt.Ltd., 2011.
R3: Kenneth Ayala, "The 8051 Microcontroller", 3rd Edition, Delmar Cengage Learning, 2004.
R4 : Krishna Kant "Microprocessors and Microcontrollers" PHI, 2007.

WEB MATERIALS:

W1:https://www.oms.bdu.ac.in
W2:https://www.freebookcentre.net.
W3:https://www.academia.edu
W4:http://www.studocu.com

19/1/23

Course In charge/Coordinator

Module Coordinator

K. Kavitha
HOD/ECE 19/1/23

VELAMMAL COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS), MADURAI-625 009
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
2022-2023 ODD SEMESTER
COURSE PLAN

Degree	B.E. – ECE
Course Code-Title	OIC751-Transducer Engineering
Batch	2019 - 2023
Year/Semester/Section	IV /VII /A
Course Component	Open Elective
Name of the Instructor	Dr.N.Nagarani

Session No.	Topic to be covered	Applications/ Examples	Text/Reference Book PageNo.	Mode of Delivery	Teaching Aid	No. of Hours	Cumulative No. of Hours
UNIT I - SCIENCE OF MEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS							
1.	Units and standards		R2(31-38)	L+D	BB	2	2
2.	Calibration methods – Static calibration		R2(31-38)	L+D	BB	1	3
3.	Classification of errors :- Limiting error and probable error	Voltmeter	R2(22-26)	L+D	BB	1	4
4.	Error analysis :– Statistical methods	Ammeter	R7(60-101)	L+D	BB	2	6
5.	Odds and uncertainty		R7(82-93)	L+D	BB	1	7
6.	Classification of transducers – Selection of transducers.	Flow Meter Torque tube	T2(16-17)	L+D	BB	2	9
UNIT II - CHARACTERISTICS OF TRANSDUCERS							
7.	Static characteristics: – Accuracy, precision, resolution, sensitivity, linearity, span and range		T2(68-86) T3(5-9) R2(10-18)	L+D	BB	1	10
8.	Dynamic characteristics:		R7(102-108)	L+D	BB	1	11
9.	Mathematical model of transducer: Zero order transducers	Mass-damper system	T2((86-93) R2(126-127)	L+D	BB	1	12
10.	I order transducers	Mass-heating system	T2(93-96) R2(127-136)	L+D	BB	1	13
11.	II order transducers	Seismograph, Force gauge	T2(97-114) R2(130-136)	L+D	BB	1	14
12.	Response to impulse, step inputs	Seismic accelerometer	T2(68-86) R2(10-18)	L+D	BB	2	16
13.	Response to ramp and sinusoidal inputs		R2(18-22)	L+D	BB	2	18

			R7(102-108)				
	UNIT III- VARIABLE RESISTANCE TRANSDUCERS						
14.	Principle of operation, construction details, characteristics and applications of potentiometer		T1(99-116) T2(154-162)	L+D	BB,LCD	3	21
15.	strain gauge, resistance thermometer	Conveyor belts	T1(116)	L+D	BB,LCD	2	23
16.	Thermistor	Thermocouple	T1(151-154)	L+D	BB,LCD	1	24
17.	hot-wire anemometer		T1(154-155)	L+D	BB,LCD	2	26
18.	piezoresistive sensor and humidity sensor.		T1(158-160)	L+D	BB,LCD	1	27
	UNIT IV- VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS						
19.	Induction potentiometer		R2(626-632)	L+D	BB,LCD	1	28
20.	Variable reluctance transducers		T1(275-283)	L+D	BB,LCD	2	30
21.	EI pick up		T1(284-290)	L+D	BB,LCD	2	32
22.	Principle of operation, construction details, characteristics and applications of LVDT		T1(318-322)	L+D	BB,LCD	1	33
23.	Capacitive transducer and types	PH meters	T1(322-323)	L+D	BB,LCD	1	34
24.	Capacitor microphone		T1(300-307)	L+D	BB,LCD	1	35
25.	Frequency response.		T1(307-310)	L+D	BB,LCD	1	36
	UNIT V- OTHER TRANSDUCERS						
26.	Piezoelectric transducer -		T1(36-39)	L+D	BB,LCD	1	37
27.	Hall Effect transducer, Magneto elastic sensor	Gyroscope	T1(370-379)	L+D	BB,LCD	2	39
28.	Digital transducers, Smart sensors	Pulse meter	T1(379-393)	L+D,Mini Project	BB,LCD	2	41
29.	Fibre optic sensors- Film sensors-	Air flow sensors	T1(393-403)	L+D	BB,LCD	2	43
30.	Introduction to MEMS and Nano sensors.		T1(404-406)	L+D	BB,LCD	2	45
	CONTENT BEYOND SYLLABUS						
31.	Applications of transducers in Bio-medical Instrumentation		W3,W4	Case study	-	2	47

Total: 47 Hours

ASSIGNMENT:

1. Statistical Methods -Problems
2. Response to impulse, step, ramp and sinusoidal inputs.-II order
3. MEMS and Nano Sensors

TEXT BOOK(S):

T1: Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design,Oxford University Press, Cambridge, 2003.
T2: Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd., 2007.
T3: D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.

REFERENCES:

R1: John P. Bentley, Principles of Measurement Systems, III Edition, Pearson Education, 2000.
R2: Murthy, D.V.S., Transducers and Instrumentation, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
R3: W.Bolton, Engineering Science, Elsevier Newnes, Fifth edition, 2006.
R4; Ramón Pallás-Areny, John G. Webster, Sensors and Signal Conditioning, Wiley-Interscience 2ndEdition, 1991.
R5: Bela G.Liptak, Instrument Engineers' Handbook, Process Measurement and Analysis, 4th Edition, Vol. 1, ISA/CRC Press, 2003.
R6: Ian Sinclair, Sensors and Transducers, 3rd Edition, Elsevier, 2012.

WEB MATERIALS:

W1: https://www.engineering.unsw.edu.au/biomedical
W2: https://nptel.ac.in/courses/108/105/108105064/
W3: https://www.electrical4u.com/biomedical-transducers-types-of-biomedical-transducers/
W4: https://www.biomedicalinstrumentationsystems.com/types-of-transducers-used-in-biomedical-measurement-applications/

N.N.Rai/8/8/22 N.N.Rai/8/8/22 8/8/22 08/08/22

Course Incharge **Course Coordinator** **Module Coordinator** **HOD/ECE**