

INTERNSHIP REPORT

A Report Submitted in partial fulfilment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

ELECTRONICS AND COMMUNICATION ENGINEERING

By

S.VATHSALYA

Regdno:20331A04F5

Under Supervision of

Mr. SUDHANSHU SEKHAR BEHARA

ASSISTANT PROFESSOR

(Duration: 24th May, 2023 to 15th June, 2023)



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING (A)

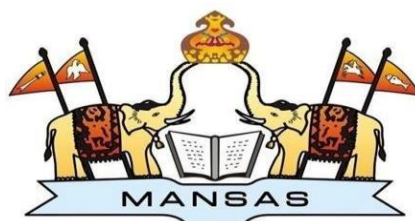
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Vijayaram Nagar Campus, Vizianagaram, Andhra Pradesh- 535005.

2020-2024

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
MAHARAJ VIJAYARAM GAJAPATHI RAJ COLLEGE OF ENGINEERING (A)**



CERTIFICATE

This is to certify that the “**Internship report**” is being submitted by **SANAPALA VATHSALYA (20331A04F5)**, in partial fulfilment of the requirements for the award of the Degree of **Bachelor of Technology in Electronics and Communication Engineering** is a work done by her at “**ITI LIMITED, Doorvaninagar, Bangalore**” under my supervision during the academic year **2022– 2023**.

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CERTIFICATE OF COMPLETION

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Certificate No 13361



ITI LIMITED

Bangalore Plant Dooravaninagar
Bangalore-560016

HUMAN RESOURCES - EMPLOYEE DEVELOPMENT CENTRE

Certificate

This is to certify that

Ms. Sanapala Vathsalya

B.Tech(Electronics & Communication)

of

Maharaj Vijayaram Gajapathi Raj College of Engineering-Vizianagaram

has successfully completed

Internship

During the period from 24/05/2023 to 15/06/2023

In the following areas

*Telephones Defence Productions, Switching Access Products,
Research & Development, Information Technology, Quality Assurance & 3D*



Vathsalya

Signature of the
Trainee
Date: 15/06/2023



Ram Surat Yadav

Issuing Authority
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ACKNOWLEDGMENT

First I would like to thank **Mr. RAM SURAT YADAV, CHIEF MANAGER-HR (ED & SD) of ITI LIMITED, Doorvaninagar, Bangalore** for giving me the opportunity to do an internship within the organization.

With reverence and humility, I thank my counsellor **Mr. Sudhanshu Sekhar Behara, Assistant Professor** for his wholehearted co-operation, unfailing inspiration, and benevolent guidance. Throughout the internship, his useful suggestions, constant encouragement has given a proper guidance and shape to my learning.

We consider it our privilege to express our deepest gratitude to **Dr. SHAIK MASTHAN VALI**, Professor and Head of the Department for his valuable suggestions and constant motivation that greatly helped the project work to get successfully completed.

We thank **Dr. K.V.L. RAJU**, Principal, for extending his utmost support and cooperation in providing all the provisions for the successful completion of the project.

We sincerely thank to all the members of the staff of the department of Electronics and Communication Engineering for their sustained help in our pursuits.

With great solemnity and sincerity, we offer our profuse thanks to our management, **MANSAS** for providing all the resources to complete our project successfully.

We thank all those who contributed directly or indirectly in successfully carrying out this work.

S. Vathsalya(20331A04F5).

MISSION AND VISION OF THE INSTITUTE

Institute Vision

Maharaj Vijayaram Gajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Institute Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity.

Department of ECE Vision

To be a center of excellence in Electronics and Communication Engineering by making students abreast with contemporary technologies meeting the standards of global industry and to develop them into skillful engineers who are technologically superior with knowledge of core as well as inter disciplinary domains with human values.

Department of ECE Mission

- Establish a unique learning environment to enable the students to face global challenges by using local technologies in Electronics and Communications.
- Establish centres of excellence in niche technologies to include the spirit of innovation and creativity in faculty and students.
- Provide the environment for collaborative and inter disciplinary activities that enables students to develop industry ready and entrepreneurial skills.
- Provide ethical and value-based education to serve humanity by developing socially sensitive engineers.

PROGRAM OUTCOMES(POS)

Engineering Graduates will be able to:

1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation make effective presentations and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

PSO1: An ability to design and implement complex systems in the areas related to Analog and Digital Electronics, Communication, Signal processing, RF & Microwave, VLSI and Embedded systems.

PSO2: Ability to make use of acquired knowledge to be employable and demonstrate leadership and entrepreneurial skills.

ABSTRACT

ITI Limited, earlier known as **Indian Telephone Industries Limited**, is central public sector undertaking in India. It is under the ownership of Department of Telecommunications, Ministry of Communications, Government of India. It was founded in 1948 as a departmental factory, incorporated as a public company in 1950 and today has six manufacturing facilities at Bengaluru, Naini, Mankapur, Raebareli, Palakkad and Srinagar which produce a range of switching, transmission, access and subscriber premises equipment. It is headquartered at Bengaluru.

It has multi-locational electronic assembly and mechanical manufacturing facilities, countrywide marketing and customer support centers and in-house R&D for absorption of technology, indigenous development of products for in-house manufacturing. It produces GSM mobile equipments at its Mankapur and Raebareli facilities. These two facilities supply more than nine million lines per annum to both domestic as well as foreign markets. The Palakkad unit is responsible for data handling with assembly and personalization of smart cards and electronic manufacturing facilities for PCB's, HDPE Pipe, Smart Energy Meters, Micro PC under Smart City Mission etc. It also produces Information and Communication Technology (ICT) equipments such as network management systems, encryption and networking for internet connectivity, and secure communications networks and equipment for the defense. The company has 1975 employees as on July 1, 2023. On 01-10-2020, ITI Limited signed a contract with Defense to implement Rs 7796 Crore ASCON Phase-IV project.

The company is well known for its products in major industries and even in military based services. ITI LIMITED offers a wide range of application products while talking about Bengaluru it manufactures Switching equipment, Transmission: IDR, SATCOM, Microwave Defence Equipment.

The most prestigious project from Indian government ASCON Solutions company has been contracted for ASCON phase-IV project, ITI manufactures other things like Radio modems, 3D-Printing, it provides EMI and EMC testing services, PCB manufacturing, DMR, etc.

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WEEKLY OVERVIEW OF INTERNSHIP ACTIVITIES

1st WEEK	DATE	DAY	NAME OF THE TOPIC/MODULE COMPLETED
	24-05-23	Wednesday	Central Machine Shop
	25-05-23	Thursday	Injection Moulding Shop
	26-05-23	Friday	Metal Test Laboratory
	27-05-23	Saturday	Transmission Defence Products (Testing.)
	29-05-23	Monday	Transmission Defence Products (Assembling)
	30-05-23	Tuesday	Environmental Protection

2nd WEEK	DATE	DAY	NAME OF THE TOPIC/MODULE COMPLETED
	31-05-23	Wednesday	Research and Development
	01-06-23	Thursday	CAD LAB(R&D)
	02-06-23	Friday	Surface Mount Technology
	03-06-23	Saturday	SMT Line
	05-06-23	Monday	3D-Printing
	06-06-23	Tuesday	3D-Printing Models & Advantages

3rd WEEK	DATE	DAY	NAME OF THE TOPIC/MODULE COMPLETED
	07-06-23	Wednesday	PCB Design Using ZukenCADSTAR
	08-06-23	Thursday	Power Supply Cards
	09-06-23	Friday	PCB Manufacturing
	10-06-23	Saturday	PCB Testing Unit
	12-06-23	Monday	Report On Overall Internship
	13-06-23 & 14-06-23	Tuesday & Wednesday	Report On Overall Internship

Learning Objectives/Internship Objectives

- Internships are generally thought of to be reserved for college students looking to gain experience in a particular field. However, a wide array of people can benefit from Training Internships in order to receive real world experience and develop their skills.
- An objective for this position should emphasize the skills you already possess in the area and your interest in learning more
- Internships are utilized in a number of different career fields, including architecture, engineering, healthcare, economics, advertising and many more.
- Some internship is used to allow individuals to perform scientific research while others are specifically designed to allow people to gain first-hand experience working.
- Utilizing internships is a great way to build your resume and develop skills that can be emphasized in your resume for future jobs. When you are applying for a Training Internship, make sure to highlight any special skills or talents that can make you stand apart from the rest of the applicants so that you have an improved chance of landing the position.

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CHAPTER-1

INTRODUCTION INDUSTRY/ORGANIZATION

ITI Limited is a public sector undertaking in the telecommunications technology segment established as a departmental factory. In 1948. The Company has manufacturing facilities in Bengaluru, Naini, Rae Bareli, Mankapur and palakkad along with an R&D Centre in Bengaluru and 25 Marketing Services & projects (MSP) Centres in India, which are located at Bengaluru, Bhubaneshwar, Chennai, Hyderabad, Kolkata, Lucknow, Mumbai, New Delhi and 17 other places Spread across the Country.

To Strengthen the Communication network for indian Army, ITI Limited, a telecom and defence equipment manufacturing psu has signed Rs 7,796 crore phase iv project of Army Static Switched Communication Network (ASCON) for deploying 10 years. Strategic network for secured Communication across the country and Subsequent maintenance for next



The Company has a diverse suite of products including manufactured products like Gigabit passive optical Network (GIPON) Managed leased line network (MLLN) products, stand alone. Signaling Transfer point (SSTP), with Access point, Radio Modem, smp's, set top Box, Defence products like multi-capacity encryption units, Buck encryption units (BEL), Terminate end Secrecy Devices (TESO), passive infrastructure products such as Optical Fibre cable, HOPE duct, Antenna, diversified products Such as Smart energy meters, smart cards, solar panels, mini personal Computers.

Besides offering the telecom turnkey solutions and customized Support, ITI has a dedicated

Network system whit for executing twenty projects for installation and commissioning of telecommunication networks. The company intends to upgrade and invest in the technology through the acquisition of technology from Strategic partner with a specific focus on high growth industry segment. The segment Company operates a data Same centre at Bengal and Currently expanding the to offer cloud based services to government institutions, departments, banks etc..

The Company is manufacturing a diverse range of information and Communication Technology (ICT) product/ Solutions to hone its competitive edge in the Convergence Vast market by deploying its rich telecom expertise and infrastructure Company is diversifying its rich telecom expertise and towards IOT, Smart city, other allied telecom products and services including twenty project execution to Offer Solutions in diversified fields.

BENGALURU:

- **ASCON SOLUTIONS:**

The Company has designed, manufactured, the earlier three phases of ASCON of has been maintained by us ASCON is an Indian Army and installed IndianArmy and this network for more than two decades. Communications project, which seeks to develop and enhance the army's Communication Services network across India. The defence services utilise encrypted and secure channels for Communications,as they deal with information that is vital to national security.

- **RADIO MODEMS:**

The Company manufactures Radio modems quite useful because of their ability to encode which are transmit, and decode data over long distances (up to approximately 10km) Radio modems also have the required Security features and bandand power selections, allowing for relatively easy deployment. Radio modems, use radio waves foot data transmission, offering users an added advantage over wired data transfers Radio modems are used to create private radio networks that are used in Critical Industrial applications, when real time data Communication is needed, enabling users to be independent of telecommunication or Satellite network operators. In most cases. are we licensed frequencies, either in the ultra high frequency (UHF) or very

high frequency (VHF) bands. In certain. areas licensed frequencies may for a given user, thus ensuring be reserved a lesser Likelihood of radio interference from other radio frequency transmitters. Radio modems can also be used in multiple access networking as well as to extend LAN networks and CCTV applications, among others.

- **3D PRINTING:**

3D printing is a manufacturing process used to make physical objects from a preexisting digital model. It is an additive process in that the final product is manufactured by layer-wise addition of material By Contrast, subtractive manufacturing uses methods where material is removed to get the final Shape or form. Currently 3D printing finds wide. applications across multiple industries, with automotive, aerospace, and consumer electronics.

- **EMC and EMI Testing Services:** ITI has set up Telecom Testing lab in Collaboration with DOT's National Digital Communications policy, making mandatory testing, Validation and security certification of Various network elements of Telecom network to protect, secure and make it Loss Vulnerable from internal and external threats. The laboratories have the capacity to test and Certify the Standards. network elements as per National & international This lab is a part of the Telecom Testing Centre which ITI has built in-house as per the MOU signed with TEC to meet the EMC requirement of the Telecom equipment launched in the market. This lab can test industrial, scientific Medical and IT equipment for Emission and Immunity requirements of TEC as per international standards.

- **OTHERS:**

Similarly they are specialized in PCB manufacturing, WIFI hotspot Modems, Digital Mobile Radio(DMR), Multi-post S3 Electronic Voting Machine(EVM), HDPE Pipes, OFC's, SMPS, and many more.

CHAPTER2

PROGRAMS &DEPARTMENTS

2. INJECTION MOULDING

Injection Moulding is a method to obtain moulded products. by injecting plastic Materials molten by heat and then cooling and solidifying them. into a mould and then cooling and solidifying them. The method is suitable for the mass production of products with Complicated shapes and takes a large part in the area of plastic processing.

Injection molding is a forming process using molds. Materials such as synthetic resins (plastics) are heated and melted, and then sent to the mold where they are cooled to form the designed shape. Due to the resemblance to the process of injecting fluids using a syringe, this process is called injection molding.

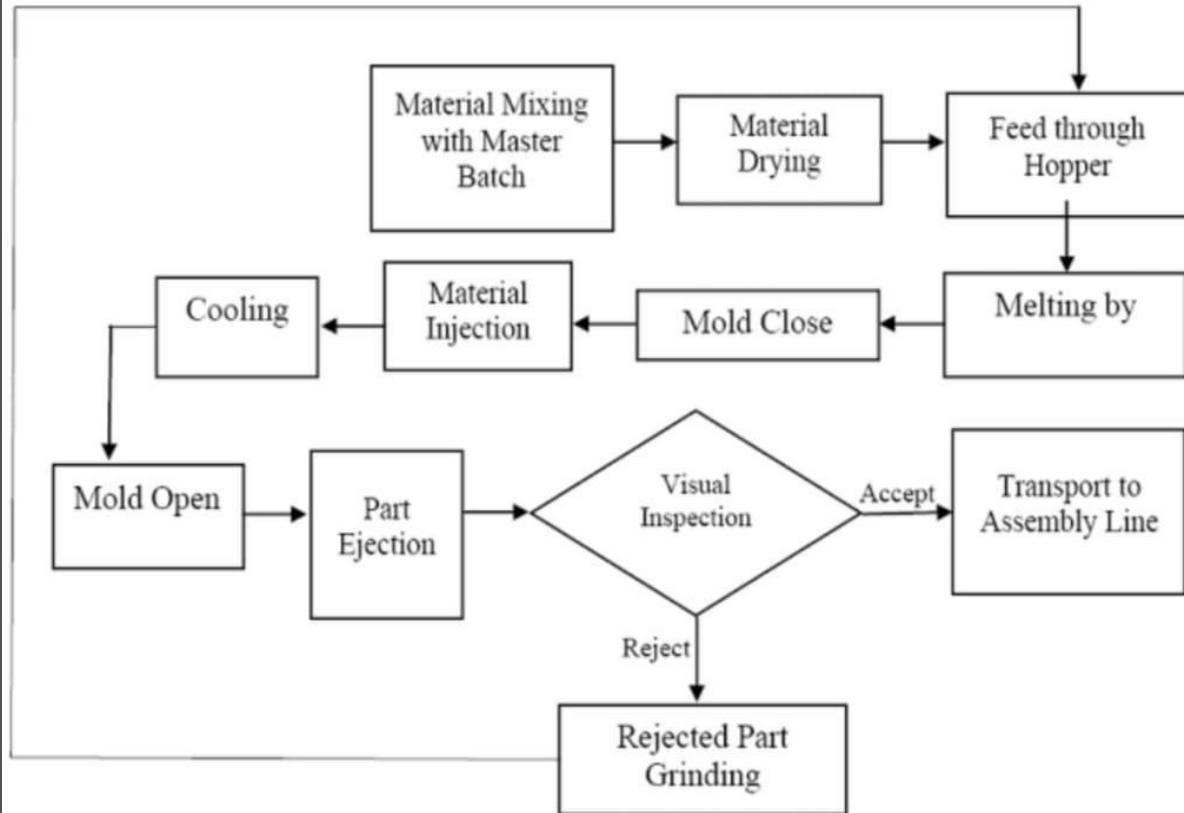
In ITI, this moulding will takes place as per Raw materials which is in the form of granuals for the required plastic Components used in telecom industries.

Similar to Injection moulding there. are Other methods like Extrusion moulding, compression moulding, Blow moulding, Rotational moulding also sometimes called Roto moulding These methods are well known for plastic moulding. Injection moulding is used to make very flexible products and It is virtually limitless.

This method is good for Large parts, small parts & Flexible products

The tools or moulds used here are very expensive when compared to Other moulding methods. The moulding process consists of several Stages Steps. It can be represented as an flow chart. as follows. The raw material used are selected by the requirement of the client, general materials are PC, Glass fibres, HDPE, LDPE etc.

Flow Chart representing the process of injection moulding:



Depending upon the size of the mould the machine Corresponding to its size will be selected Normally there are 150 ton, 200ton and 300 ton. The process in machine takes place Stepwise, the raw materials first loaded into the machine and they will be melted It is passed through the metal pipe and to the injector which injects the molten plastic into form a shape and It to make it mould or tool to will be cooled for some time Solid. The end product will be with ejection holes filled with that plastic which resemble just like an ific pipe. Coming from the manufactured components which are generally known as ejectors which are to be removed and reused as raw materials. for other products The raw materials we use for making Components for Injection moulding are poly Carbonate plastic Glass fibres, HDPE, LDPE, UV grade plastic, Acrylonitrile Butadiene Styrene (ABS).

3. CENTRAL MACHINE SHOP

As the name implies the department. machines to perform certain operations in electronic devices or Contains some Specific manufacturing anything which has to be do To me with punching, bending and Fastners operations.

we have seen three Machines in the department namely

- 1) CNC turrent punching machine
- 2) CNC press break
- 3) Fastners insertion machine (FIM).

1) CNC turrent punching Machine:

CNC turrent punching Machine is used for making Schematic holes to the equipped metal plates (metals like Aluminium These Stainless steel & Aluminium sheets are the Raw materials for the Machine.

CNC was au means Computer Numeric control that means It Controlled and operated through a Computer And also the design can be structured or using program Software called Illustrated by CADMANP. Every shape the machine Can punch as a whole can be Considered as a tool for the Machine. so just like that the CNC Punching Machine has about 48 tools like Rectangle, Triangle, circle, Conical etc.

2) CNC Press Break:

It was like a Machine used to bend something in required Shape and not damaging the Clamps, or manufacturing product. CNC press brakes or CNC Metal benders are essentially machines designed to bend sheets metal and Sheet metal Components to Various profiles and designs. The Structure of a CNC press brake machine can be of two types They are as follows

- Type-1 :(Down Forming) → bottom portion is fixed
- Type -2: (Up Forming) → Top Portion is fixed

3) Fastener insertion Machine

Fastener insertion Machine is one of the most relied on tools within the industry that can deliver consistency in inserting self clinching nuts, rivet nuts, studs, standoffs with good accuracy, and repeatability.

It is a hardware device that mechanically joint or affixes, two or more objects together. They can be made from metals, plastics,

Advantages: Removable, Easy to install, wide variety of Stand and parts.

Disadvantages: Loosening, Failure, Cost.

4. METAL TEST LAB

For any manufacturing industry, and the raw materials are needed, those things should be tested for different needs, component or product.

Anything which is to be manufactured or is manufactured undergoes, Certain tests.

1) Mechanical test

2) Electrical test

3) Chemical test.

The test Conducted by the employee should be successful in passing the product further to the Here in ITI the tests which we next level, have exposed to are Electrical and Electronic Device tests.

Every Component or end product from a company has its own Code .For example we have consider a resistor code just as DC 435 was a Global code and vendor code.

→ Global code: It was accepted through out the world of the certain industry related to that product Vendor code is similar to that of Global code.

Leaded Components:

Leaded packages have little legs around the perimeter of a Component, which can either go through a PCB's backside (through-hole) or directly to the PCBs frontside (surface mount) .

SMD Components:

Surface mount devices, electronic function parts that are the main Soldered onto the Circuit board using surface mount technology. SMT - pick and place Machine.

ELECTRONIC TESTS ARE GIVEN BELOW:

1. LCR meter
2. Micro-ohm meter
3. Insulation test
4. Oscillator test
5. Digital Vary AC

5. TELEPHONE DEFENCE PRODUCTION

In ITI TDP is most Important pointment to produce the devices for Communication in Defence Sector. It provides both Defence Systems telephones and public service telephones as well.

The telephones used in Defence sector is Field Telephone. It was also known as 5C Telephone.

It can be Field telephone or Be Telephone It has modes for different Communications.

- Magnetic mode (one way - 4.5V)
- Auto /CB (central Borilary)
- Radio.
- Line mode (LH)

To test there telephones we require a pulse switchable Telephone Analyser

Magnetic mode is for uni-direction packet of Data There is only one way to sent a message and after that the another one send a message.

Both of them cannot send the message at a time each other This was called Half Duplex Communication.

Every telephone will have a Ringer Cand for Ring purpose It was an circuit Embedded in the telephone circuit .

Multi frequency of dial tone depends of the key number. ie, the we will have about a 12 differentfrequencies for different numbers.

Speech test is performed by using the telephone with Alternating Current about a voltage of 4.0V.

It is for only of a distance of 40 km range. distance increases then the frequency is also increased in the test.

Battery Check is one of the most important thing that whether the battery is in normal condition or not.

5C telephone provides a knob which can change the mode of operation or Communication, user wishes to use. This was only possible because of the development of technology in the time of world war-I & II

These Field telephones operate over wire Lines. These Field telephones operates between a range of frequencies from 945.8 HZ to 1336.7 HZ.

It works on standard frequencies given by the Defence authorities. and attenuates all the other frequencies not specified in the design.

Execute Telephone System:

In Common terms it was like Boss-secretary system. If power is on the phone will work as Boss If not it will work as normal phone.

There are two Buzzers for Intercom purpose. purpose. works with a Microcontroller and Ringing

Two buzzers

1)x-line

2)Intercom line.

we measure Send and side tones Voltages while testing.

send { LL > 580 mV and SL < 387 mV

Side tone{ LL > 130 mV and SL 110 mV.

The ringing frequency med for 5c telephone is 25 HZ As already discussed the ring card is a amplified circuit Both the telephones from Transmitter to Reciever there will be field line. (physical line). The Circuit Contains 3-op Amps. and a push-pull circuit

SAMPLING AND BIT RATES:

European :-

$$E_1 \Rightarrow 32$$

$$32 \times 64 = 2048 \text{ Kbps}$$

$$E_1 = 2048 \text{ Kbps}$$

$$E_1 = 2.048 \text{ mbps}$$

\Downarrow

RT45 (cable)

Balanced (120 Ω)

$$4 \times E_1 = E_3$$

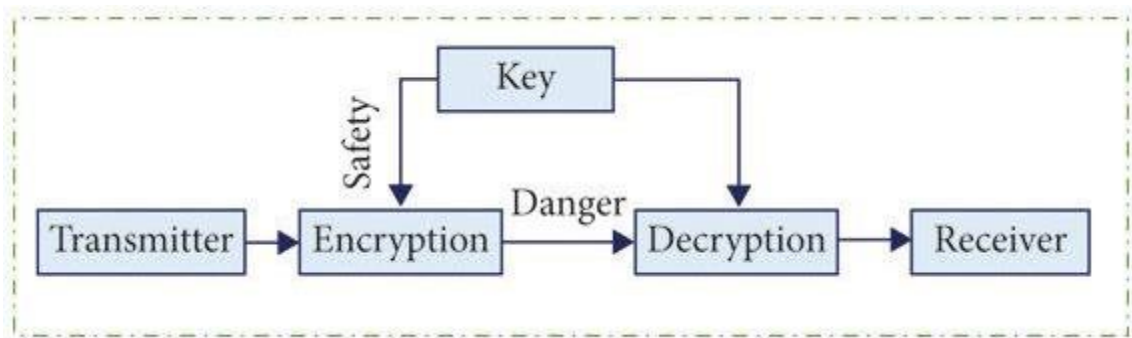
$$\Rightarrow E_3 = 34.368 \text{ mbps (Balanced mode)}$$

75 Ω (Unbalanced)

$\Rightarrow 4 \times E_3$ 1 STM1 $\Rightarrow 155 \text{ mbps} \rightarrow$ Optical Fibre cable are used to transmitt or recieve such higher bytes data

$$\Rightarrow 4 \times \text{STM1} = \text{STM4} \Rightarrow 622.08 \text{ mbps}$$

Encryption and Decryption:



Encryption is necessary to make your transmitting data safe- If it is not done 3rd party Candidates can get you with your private information or data.

Encryption can be done in two ways/ methods.

- ALGO: Multiple data element Carrier are used or multiple. data Transmission lines are used.
- Key: Some protective code or key pattern or Part will be added to transmitting data/signals.

6.INFORMATION TECHNOLOGY

Information Technology is the Combination of information and communication Technology. It is the hardware and software used to create, store transmit, manipulate, and display information and data Metaphorically, It is the lifeblood of the information Age - on other thought It is anything and everything that has to do with Computing and communications.

There is so much things to do with IT in domain of Business, every industries, even for government to get the data of everything on their plans and organizations need Information to be manipulated & Stored. with Such necessity IT had become a Sector with every mass business domain and organizations.

with IT professionals one can improve their Business strategies and can plan for Something which is great for every one.

USB:

A universal serial Bus is an industry standard that specifies the physical interfaces and protocols for connecting data transferring and powering of hosts, such as personal Computers, peripherals, Ex: keyboards, mobile devices and intermediate hubs.USB (universal serial Bus) .It is a computer expansion card that generates

VGCA:

Video Graphic Card Array is a feed of graphics output to a 02 display device such as monitor Graphics cards are sometimes called discrete dedicated graphics processor on the motherboard of the CPU.

RJ45:

It is a Connector which are most Common to connect One only used Internet- enabled device with another network device. These functionality is quite similar to the Ethernet ports. Rj45's Rj stands for 'Registered Jack.' a standard designation that oriented with the universal Service ordering code (USOC) Scheme of Bell system back in the telephone interfaces.

7. RESEARCH AND DEVELOPMENT

Research and development is excellent department in ITI It Redevelops or improveth the one which is already developed and they help in they help in developing product to its ultimate level

R&D have Two Divisions: Software and Hardware.

Hardware was non means we can include everything which digital but in some cases either ways digital Analog technology and Communication modes all comes under Hardware.

Encryption: Adding Some unrelatable extra message to the transmitting signal and incase of bit data adding parity and check bits explains the Encryption process.

Decryption: At the reciever end the message was reconstructed by deleting the extra noise and Parity bits from recieving signal and amplifying it.

Specifications: Design equations, properties, features of a component gives Specifications. The technical specification of an Component is Voltage, Current, over voltage, under voltage

AC Voltage: frequency of AC voltage is 50HZ (Have Some frequency)

DC Voltage: frequency of DC is 0HZ (No frequency).

power supply card: The input will be AC and two output levels will be obtained 12 volts and 5 volts in DC. In this process the AC Voltage. being converted into DC Voltage

Diodes: A diode is a two-terminal device. Diodes are made from. Semi- Conductor materials mostly, silicon, germanium. It allows current to flow easily in one direction, but Severely restricts current from flowing in the Opposite direction Examples of general diodes are LEDs, Laser diode etc.

Applications:

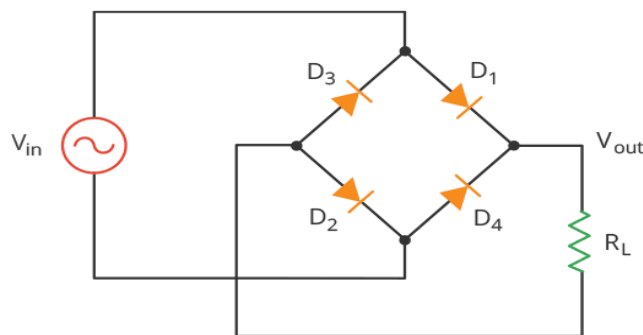
- 1) Rectification: Turning AC into DC Voltage
- 2) Drawing signals from a Supply
- 3) Multiplexing signals.
- 4) As a Voltage Regulator

Rectifier:

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The reverse operation (converting DC to AC) is performed by an inverter.

There are three rectifier discussed as

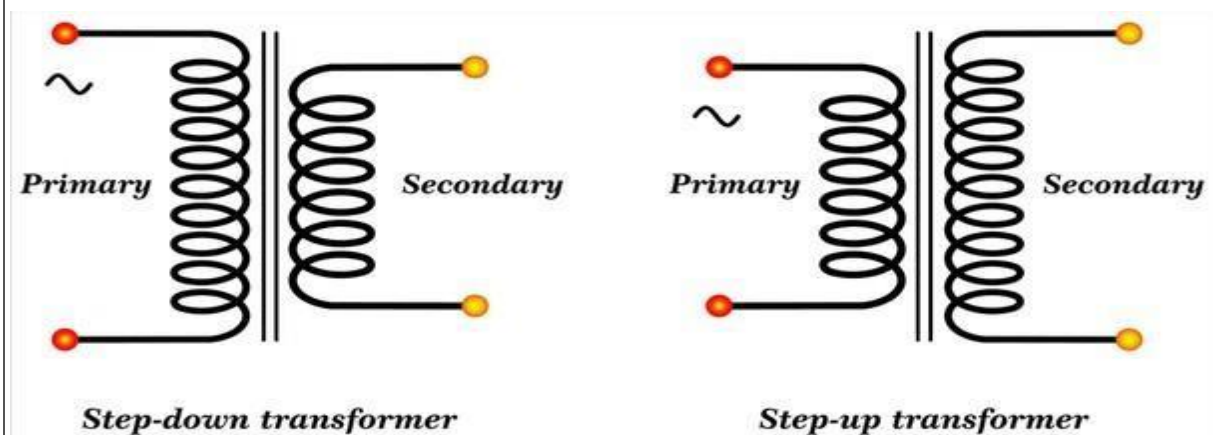
- 1) Half wave Rectifier
- 2) Full wave Rectifier
- 3) Bridge wave Rectifier → 1.1 times the given input



Capacitor:

After the Rectification is done by the Bridge Rectifier the output obtained is not pure DC. Some distorted pc will be obtained. So For filtering purposes capacitor can be used. We will get an output of Reduce that Circuit board. We use a 300-400 Volts So to high capacitance in the Or before that we use a Step down transformer.

Transformer: An electrical device that can change the Ac current is know as transformer.



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It can help in reducing the fractions of direct output from the circuit wing Step-down transformer. But the output will not be pure DC. It is Still the distorted output.

Those distortions are called Ripples.

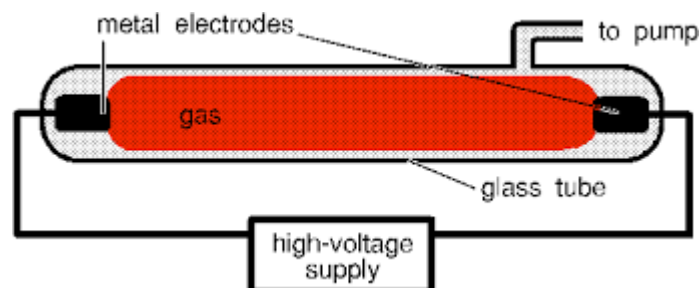
By using certain ordered Analog or digital filters those distortions can be removed. And we get pure DC.

Protection Devices:

It is important to check for the unnatural disturbances in the Current or voltage while operation It the Voltage Supplied is slightly become high then the whole equipment will Bun out It will effect the products cost, time, and Component used cannot be used again because of damage taken So We use Something which makes circuit safer whether any high voltages run through the protection Device itself gets damaged and open the Circuit to stop the flow of current. The Best example for these type of devices is Gas Discharge tubes (GDT)

GOT: Gas Discharge tubes:

when high voltage Current passes through it will break or It will blast tomake the Collateral damage small and every other Component will not take any damage any Some other examples are Fuses, Fusible Switches, Reed Switches, Magnetics etc.



8.CAD LABORATORY

CAD Laboratory is within the R&D Department in ITI Limited. It was mostly the place where the PCB structure is designed Every layer designed by keen observation and blue prints were taken and prints are also taken according to the defined measurements and readings.To design piececs there is a software just similar to the AUTOCAD ie," Zuken CADSTAR"Software There are certain steps to follow to design a PCB.

- Opening new file and click on edit
- Then new file will be opened
- Icons appear when we click on edit.
- Component are to be selected drag on to the file
- Right click on the component makes is to access the component dimensions and specifications

The measurement are too low so that it was about 60 mills and it is a 1/1000 of inch. The whole schematic is ready when the circuit was designed Specifically with interconnections in it.

PCBs and CAD:

CAD is used during the development of creating a PCB There are many different types of CAD softwares.

→Schematic capture:

This design process begins with the CAD technician mapping the Componentpositioning and connections that will be on the PCB. This is know as schematic capture".

It determines what component is to be in the circuit and how they are joined. The electrical traceson a schematic are caved 'nets'.

A wer can use an existing Schematic or they can create. their own.

The designer will run simulations to test how well the Schematic design, or will operate as an actual circuit. The path way between any two connections or the path in a Connection would be smaller as its minimum.

→Turning Schematic capture into a circuit:

Once a schematic has been tested and approved. the design must be transferredinto an actual CAD drawing of the circuit Board. The dimensions of circuit Board are realived,along with the placement of the Components and copper trace Connections. often, programs will have a ‘switch to board’ command on the CAD program.

→**Routing:**

In this, the designer routes the Copper Connections between Components the CAD software will have a 'route' tool to assist with Manual routing. Also there are programs which have Auto routing Software Traces can be transferred from one side of the board to another side there are small drill holes loaded with copper on actual circuit.

9.3D-PRINTING

3D printing is also called Additive manufacturing process. It is the process of making three dimensional Solid objects from a STL/VRML file.

Examples Can be defined as the prototypes of a required model based Machines. (model & infrastructure can be easily done).

Advantages:

- Rapid prototyping
- Faster production
- Economy of scale for Small Volumes.
- There are many Technologies for 3D printing
- Better Quality
- Negligible wastage
- Complex shapes.
- New Shapes structures.
- Reduced production cost.

In ITI there are two technologies used for 3D printing

1) FDM Technology

2) Polyjet Technology

The 3D printing Manufacturing process is not suitable for mass production. But it was very helpful with Some features like Accurate, time complexity etc. In this the digital model is turned into a tangible, Solid three-dimensional object.

The 3D printing is an Additive process, already said above, and that there are Some layers which are Added together in the process to form the modeled object

The direction of Additive configuration is from bottom to top. It was Just like the Cutting Process and attaching them with each other. How it shows is the ultimate result of the process. In this process using any technology any thing Can be designed to get an optimum Conclusions about Some thing Using 3D by Checking printing. the prototype made by was very helpful in many Sector in the world for example medical organisations, R&Ds, Schools, Military, Engineering designers, construction Companies, and many more industries in the present world.

FDM Technology Fused Deposition Modeling:

Build size 450 mm: 406 x 35.5 x 406 mm [16x14x16 in] Accuracy: parts are produced within an accuracy of 127 micron.

Applications: Any proto.

Typing, injection Die tool, moulding tool etc.

FDM is the process of making physical objects by building up successive layers of material. A thermoplastic filament is pushed through an extruder and deposited where needed in each layer to complete the desired object.

Advantages:

- 1) It is Affordable
- 2) It works with many materials like PLA, ABS, ASA etc
- 3) Models can be very detailed.
- 4) The Filaments are not easily contaminated
- 5) can print Large Builds.

PolyJET Technology:

It is a powerful so printing tech that produces smooth, accurate parts, prototypes and tooling. It has microscopic resolution layer and to 0.014 mm. It can accuracy. down produce thin walls and complex geometries using the widest range of materials available with any technology.

- Over 360000 Colors can print.
- Multi color proto-Typing can print.
- Build Size: 490x 390 x 200 mm. [19-3x15-35x7.9 in].
- Layer Thickness Horizontal build layers down to 14 microns [± 0.00055 in].
- upto 200 microns for full model size [for rigid materials only].

10.Surface Mount Technology

SMT: Surface mount technology (planar mounting) It was an Electronic manufacturing centre where SMT is used design and create the SMDS (Surface mount Devices) to to get a final product.

First of all the SMT is whole different Concept or opposite from through hole process.

As already we know that the PCB are The most vulnerable layers in primary layer and Secondary layer.

Most of the Active Components are Layer. And some of the most of the primary remaining Active Components and the passive Components will be placed on the Secondary layer.

The traces are the Markings on the printed circuit board with solder paste in them. The pads are the ones which connects the leads of the Component in the PCB.

The Best example for a surface mount devices is some Sought of and pin configured microprocessors and Microcontrollers devices like Micro processors and Micro controllers.

An example for an IC is 7408 IC which is an AND Logic IC. It was having 14 pins and pin14 is ground and pin7 is Vcc.

It is Dual input package. Either ways there are two input and Operational outputs can be observed on an And gate truth table.

In SMT there are two types of Machines

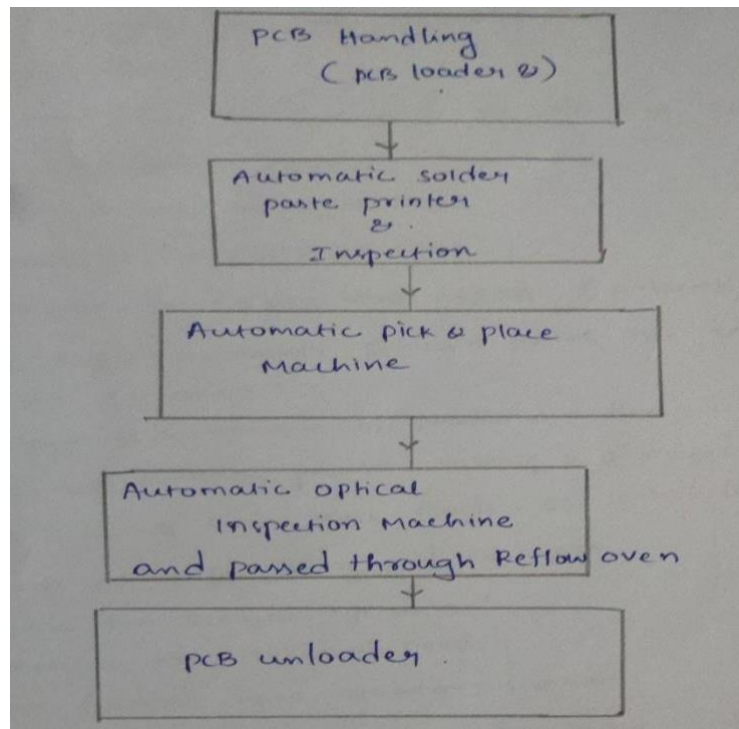
1) In Line Machines.

- PCB Handling Equipments for SMT line
- Automatic Solder paste printer
- Automatic Solder paste inspection
- Automatic pick & place system.
- Automatic optical inspection machine.
- Forced Convection SMT Reflow oven

2) Offline Machines

- X-Ray Machine for inspection of PCB
- Semi-Automatic IR based SMT Rework station
- Semi Automatic Hot air SMT

FLOW CHART REPRESENTING SMT:



Inline PCB processing is done by following the above flow chart in a systematic order.

PCB Handling Equipment :-

PCB Loader and unloader:

- Led tower light with Bugger.
- Emergency switch
- Magazine rack so slots and for size 510mm x 510mm
- Exchange time: 28sec
- Bottom to top magazine flow

Automatic Solder paste pointer:

The model no: SERIO 4000, EKRA (present) (ITI ltd) As the name represents It will print the solder paste on to the PCB board. Solder paste is a mixture of powder and flux, it is fluid during the printing process. viscosity is a major indicator of the form of solder paste fluids.

- Suitable for Stencils up to 31"
- Customized for individual needs.
- print format upto 610mm x 510 mm
- program change over time less than 2 minutes.
- EMS Manufacturing for high volume/ high mix applications.

Automatic Solder paste inspection machine:

It will Inspect the solder paste on the Board whether it appropriately distributed or not. The leads need to be put on that paste markings So it should be checked carefully whether the marking of solder paste is good or not.

- It fully Automated SPI system.
- Shadow free inspection technology and software to deliver 100% 3D inspection of solder paste.
- Highest accuracy and repeatability.
- Shortest programming time.
- Easy UI & Spc plus included to help pointing process optimization
- No PCB colour sensitive.

Automatic pick and place system :

It is a multi component mounter, rated capacity of 104000 CPH and Completely configurable as per production requirement with different placement heads in NXTIII with a feeder Capacity of over 285 nozzles of 8mm slots. The components feeded through Gun Structured thing with a plastic Embossed tape with large number of similar components which are to be mounted on the PCB.

Automatic Optical Inspection Machine:

Automated inspection for Solder defects, lead defect, Component presence and position. Correct part number and polarity, through hole parts and paste.

- Minimum Component size 0201 to 01005 with high Magnification option
- Color, OCV, bar code recognition, both image and rule based algorithms.
- 5 mega pixel automated optical system with 12 micron high magnification

- Quick set up
- High speed
- PCB Handling size 22" x 20"
- High detect coverage and Low false failure rate.

Forced Convection SMT Reflow oven:

- 12 heating zones and 4 cooling zones.
- Autoset profile/recipe generator
- 350°C maximum setpoint temperature.
- Flux flow Control flux evacuation system.
- Patented Individual call Inlet and Exhaust enables optimized gas flow management.
- Easy to maintain Cooling Zones.

11.PCB MANUFACTURING PLANT

PCB: printed circuit Boards.

It is an essential part of most electronic devices. from televisions to computers. We can understand a PCB's basic anatomy.

PCB Can be of three different types.

- 1) single layer 031 single sided pcs (one Copper layer)
- 2) Double Sided (two copper layers. on both sides of substrate layer)
- 3) multi layers (outer & inner layers of copper, alternating Layers of Substrate).

The material used as substrate is crucial for outcome and Success of a high quality PCB.

These materials are created in a way that has often been Compared to a Sandwich.

The substrate in the PCB is made of a dielectric material most Commonly composed of epoxy resin and glass fibre weave (sometimes unwoven).

Instead of Copper Clad or plate one Can use Resin and glass BT Epoxy (Bismaleimide Triazine) is a thermoset resin used in manufacturing a PCB.

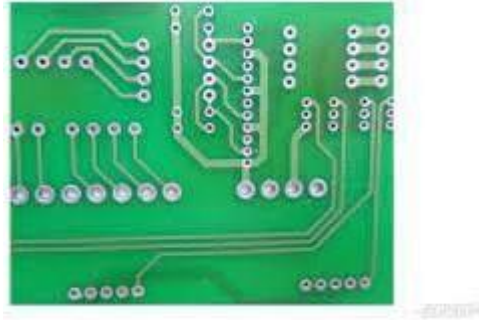
1) single sided PCB:

These are the circuit Boards with one layer of conducting material on one side of the Board, while the other side is used for incorporating different electronic components

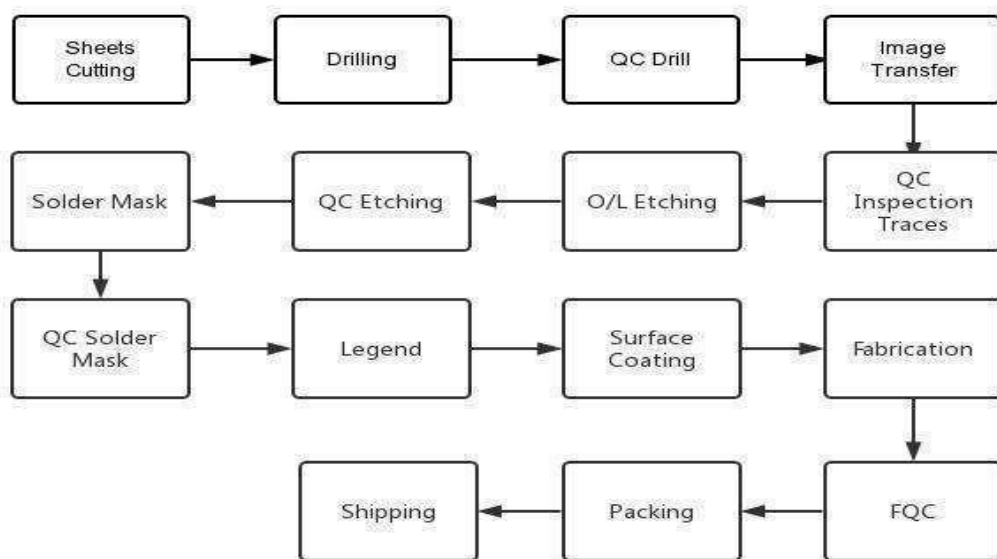
It is also called one layer PCB. There is no cross permitted. each line must have its own path so it is more frequently used in the early PC Board circuits.

Single sided PCBs are used by industries are different sectors

- medical Devices
- LEDS
- Consumer Electronics
- Industrial Equipment
- Automotive Components



FLOWCHART OF MANUFACTURING SINGLE SIDED PCB:



Developing: The interconnection in the PCB are developed and They can be seen clearly for individual copper clade.

Solder Masking: Solder paste will be applied to the structure of PCB Board (those lines are not considered)

Tin stripping: Tin will be applied to the Connection markings to make it absorb tin by the required marking Tin stripping

Etching: to remove the some Laminated sheet of material in order to make it ready for next step.

Film stripping: Film will be teared off to make it process through Chemical processes to absorb and react with other materials in the process.

Copper & tin plating: Copper & tin metal pastes are plated over the PCB Connectors for connection to be made in the circuit.

Expose and Developing: After solder marking it is exposed to light or environment to make it steadily get along with. the PCB also It was developed by making it combine with resin.

Solder Coating: An plated thorough holes are drilled the whales will be inter commensed by lead and to hold that Solder paste is coated to Connect layer to layer inter connecting

Trim to Final Size: Then the PCB will be trimmed to its final life where dimensions one given by the user or customer.

2)Double Sided PCB:

plated through hole:

Plated through holes are integrated for cases where Components need a perfect electrical Connection like Connectors, Switches and Ic. These holes are used to connected leaded components on the Very PCB.

Scrubbing:

Scrubbing is the process of brushing the Copper plate to get it clean from residues. (to remove Oxidized Content) .

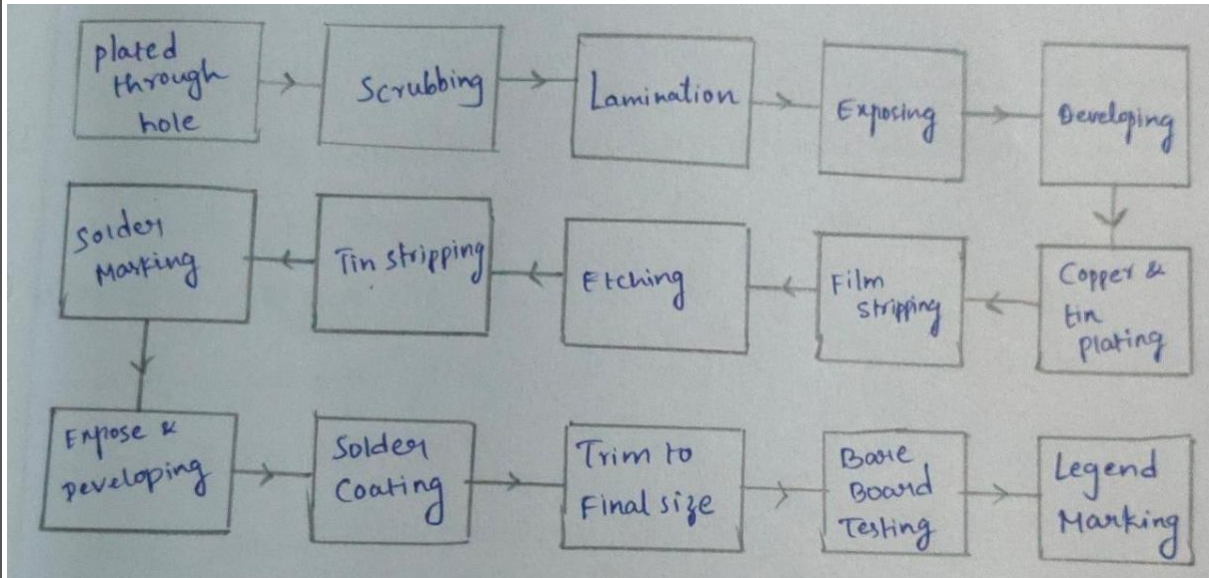
Lamination:

After scrubbing to keep it from not reacting to the Surrounding environment Lamination must be done to Copper clad other wise It will be oxidized. Precautions: Laminated sheet must not have any wrinkles.

Exposing:

Then the board is protected from not getting Corroded by atmospheric conditions.

FLOW CHART FOR MANUFACTURING DOUBLE SIDED PCB:



Bare Board testing:

After finishing the product the PCB shall be tested with their Connections made to make sure it was working.

Legend Marking:

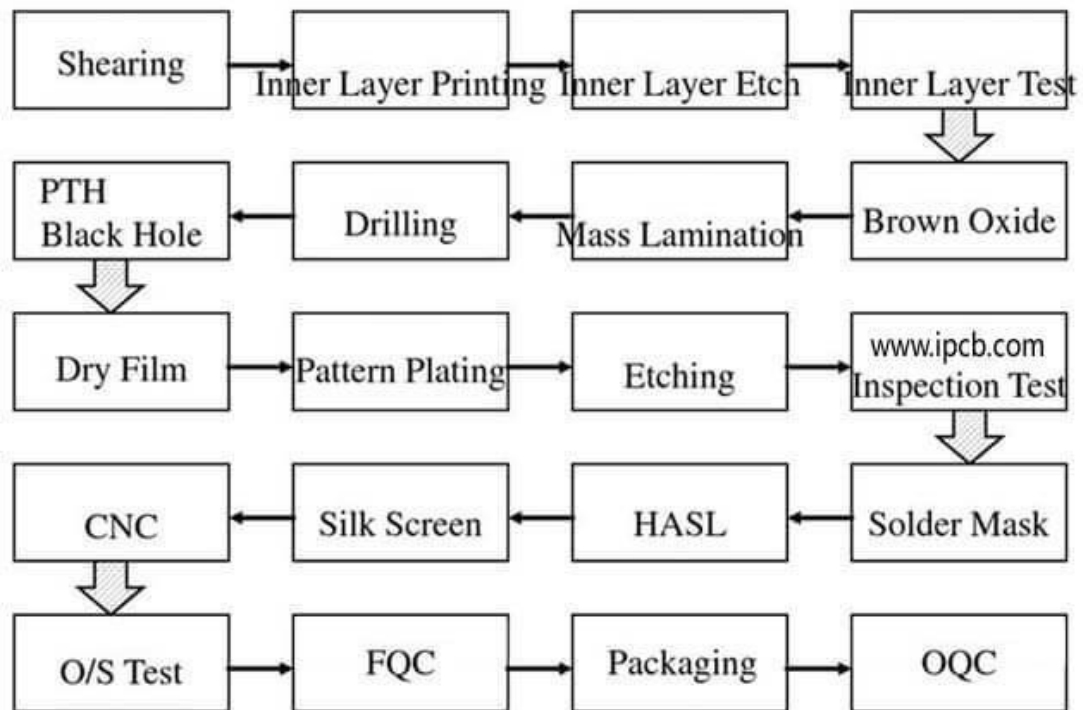
It is needed to mark the Symbols or name of the component to be placed at an allocated place on the Board.

3) Multilayer PCB's:

Multi layer PCB's are more advanced and complex than remaining two types of PCB's. These were developed because of the drawbacks made by using single and double layer PCB.

Coming to the process of manufacturing It was so Similar to the double sided PCB.

PROCESS CHART:



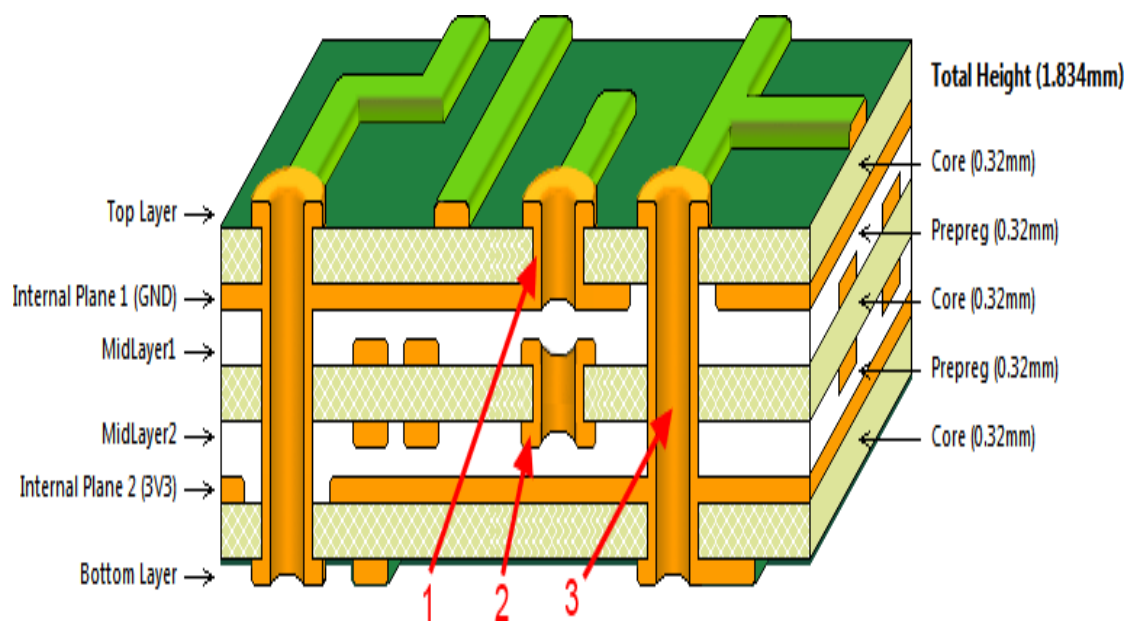
A multilayer Board will have minimum of 3 layers of conductive material.

It allows more circuitry and wiring for more complex applications.

Electronics had a drastic changes of development after multilayer PCB technology came into domain of the electronics.

Advantages of multilayer PCB over others:

- 1) High assembly density
- 2) Smaller size
- 3) Increased Flexibility
- 4) Easier incorporation controlled impedance features.
- 5) EMI Shielding through Careful placement of power and ground layers.



12.ENVIRONMENTAL PROTECTION

Environment protection is one of most important thing to be present in every company just like ITI have one. Because of unawareness of Enviromental protection so many tragedies took place in the past 50 years.

Some of them are Bhopal gas tragedy - It has an poisonous gas effect on entire environment the gas leaked was Methane isolate Occurrances Minamato, Chernobyl are other similar occurances in japan and Souchere in ukrainian SSR. It was disaster for Ukraine. These all happened because of not following proper condition issued by Enviromental Protection department

Some incidents explained by the experience of the person who was very protected much thought for Environmental Protection.

1974 water Act:

Under this Act, Sewage or pollutants Can't be discharged into water bodies including lakes and it is the duty of the state pollution Control board to interfer and stop such activity.

Checking ground water level:

Ground water can also be polluted if necessary precautions were not taken. So,at a location the ground water level should be checked and production Should not effect the Ground water by polluting it.

Air Act: 1981:

To provide for the prevention, control and abatement of air pollution in India.

Environmental protection Act 1986:

It Authorizes the Central government to improve and protect environmental quality, reduce and control pollution from the Sources and restrict to prevent the setting and operation of any industrial facilities on environmental grounds.

Some similar Environmental protection acts were announced every year with one step forward to healthier and safe life and some are given below:

- 1989 : Hazardous waste Act.

- 1999 : Biodegradable medical waste Act
2000: noise pollution Act
- 2001 : Battery Act
- 2011: E Waste Act
- 2016: Solid waste Management Act

Air Act:

It is of two types :

- 1.Stack monitoring.
- 2.Work monitoring.

To control Air Stack pollution again two methods

- i)Dry scrubber
- ii)Wet scrubber

Work Monitoring:

To check the workers condition while working with Alkalies and Acids(Chemical tests)

Every organisation should give a report on their Pollution levels to pollution Control department. Every organisation should have Environmental cell and a Qualified person in that department of sector .

Hazardous waste Act:

Hazardous waste: Reusable, Recycle and Insulation.

Treatment Storage Disposal (TSD Facility). It is the Storage, treatment, collection and disposal of hazardous waste in environment friendly manner.

Noise pollution:

Regular exposure to a higher sound level that impacts humans and other living organisms is Known as Noise pollution .

The industrial noise should not exceed 75 dB during morning and 70 dB at night

In residential areas 65 dB during day time 60 dB during night time.

E-waste:

Electrical and Electronic waste are said to be E-Waste. The items of all types of electrical and electronic equipment (EEE) and its parts that have been discarded by the owner as waste without the intention of re-use. Now day E-waste is becoming more and even more.

Solid waste management:

Now a days we are disposing wastes as Dry waste and Wet waste beacausewaste is of two types. Bio degradable(wet waste) and Non-Bio degradable(Dry waste).

The wastes are Separated from the point of collecting them and are treated according to their Chemical behaviours.

Likely every organization should maintain a solid waste management community or so and so. Which helps in separating the bio-degradable and non bio-degradable wastes in the oraganization and helps in preserving the environment.

CONCLUSION

The internship at ITI LIMITED(Bengaluru) had been an incredible and enriching experience that has provided me with valuable insights into the field of broadcasting and media. Through the internship, the opportunity to learn the things from the talented professionals who demonstrated unparalleled expertise and dedication in their respective job positions.. Specifically, learned the following things over there are:

- About CNC Turrent Punching Machine and CNC Press break.
- what is the process of Moulding and how it is done for different Electronic equipment based on the requirement.
- Types of materials used for Moulding also the functionality of Moulding machines.
- What is metal testing lab and why the tests have to be conducted.
- what are Transmission Defence Products and how they are different from normal products.
- What is Research and Development do and why it is important for an organization or industry.
- About protection devices for Integrated circuits and PCB's.
- What is 3D-printing and it's Softwares with different Machines.
- How PCB manufacturing and testing is done.
- Different types of Printed Circuit Boards and it's features & applications.
- Tools and softwares use to design the PCB inner layers.
- What is Surface Mount Technology and also understood difference between SMT devices and Leaded Components.
- What is the need for an Environmental protection Department and Why it is compulsory to have one ?

The work experience encountered during the internship developed the skills which are important to make good career in the domain of Electronics and Communication. I am grateful for the opportunity to have been a part of this esteemed Internship program at ITI LIMITED (Bangalore) and looking forward to learn more things in the field of Communications.