

Bapuji Educational Association(Regd)

Bapuji Polytechnic Shabanur,Davangere

Department of Electronics and Communication Engineering

Study Material on

Applications of Electronics Engineering (15EC54T)

Prepared by

Pushpalatha Nadiga

HOD, EC Dept

Bapuji Polytechnic

Davangere

Course Content:

Unit1: consumer Electronics

Unit2: Automobile Electronics

Unit3: Audio Systems

UNIT4: Video Systems

UNIT5: Entertainment Electronics

UNIT6: Robotics

UNIT1:CONSUMER ELECTRONICS

Topics to be Discussed

1. Calculator
2. Microwave Oven
3. Washing Machine
4. Air Condition
5. Refrigeration
6. Bar codes and QR Codes
7. Copiers ,Scanners and Printers

Consumer electronics or **home electronics** are electronic (analog or digital) equipment intended for everyday use, typically in private homes.

Consumer electronics include devices used for entertainment, communications and recreation.

List of Consumer Electronics Goods:

- | | |
|---------------------|---------------------------------|
| 1.Calculator | 13.Electronics Toys |
| 2.Personal Computer | 14.GPS Navigation device |
| 3.Television | 15.CCTV |
| 4.Digital Camera | 16.Surveillance systems |
| 5.Mobile Phones | 17.Telecommunication Equipments |
| 6.Washing Machine | 18.Cam coder |
| 7.Microwave Oven | 19.Video Games |
| 8.Refrigerator | 20.Xerox machine |
| 9.Video Recorder | 21. Fax.....etc. |
| 10Radio Receiver | |
| 11.MP3 Player | |
| 12.Printers | |

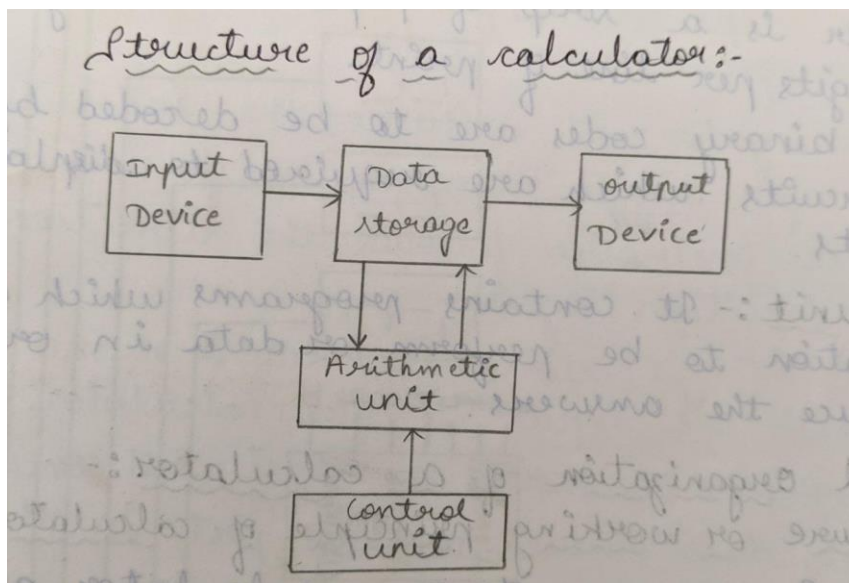
CALCULATOR:

A Calculator Is Really A Special Purpose Computer Containing A Number Of Fixed Program Routines To Perform Basic Arithmetic Operations And Other Mathematical Calculation

Fig1 Shows Basic Calculator Structure

- 1.Input Device
- 2.Data Storage
- 3.Arithmetic Unit
- 4.Out Put Device
- 5.Control Unit

Ex: $3+2=5$



Input Devices : The most input device is a keyboard. A keyboard is a group of key switches, each representing a digit or an operation. When a key is depressed, a binary code is generated and passed to the processing section for decoding.

Data Storage : When data is entered into the calculator it must be stored so that it can later be operated by the processor or arithmetic unit. The data storage area is generally made up of register stages. A register is a memory circuit used for remembering multidigit numbers and carrying out the arithmetic operations.

The Arithmetic Unit : The arithmetic unit, performs *arithmetic operations* on the data in the storage registers. It consists of an adder circuit, or an *adder/ subtractor circuits*, which receives data from storage registers and perform *arithmetic operations* and the result is stored to register for display .

Output Devices : The most common output devices used are printers or luminous displays(LED,LCD). A printer is a strip of paper containing ten to fifteen digits per line of print. The binary codes are to be decoded by the logic circuits, so that required digit can be displayed.

Control Unit: It contains programs which control the operations to be performed on data in order to produce the answers. The program consists of many binary coded instructions held in a ROM. The instructions are read from ROM sequentially and decoded to perform required control function.

Internal Organization of a calculator [Architecture or Working principle of calculator]

Figure shows the several functional subsystems of Internal organization of a calculator. The main components of a calculator are **1 Key Board** **2. Segment Display**

3. Power Supply

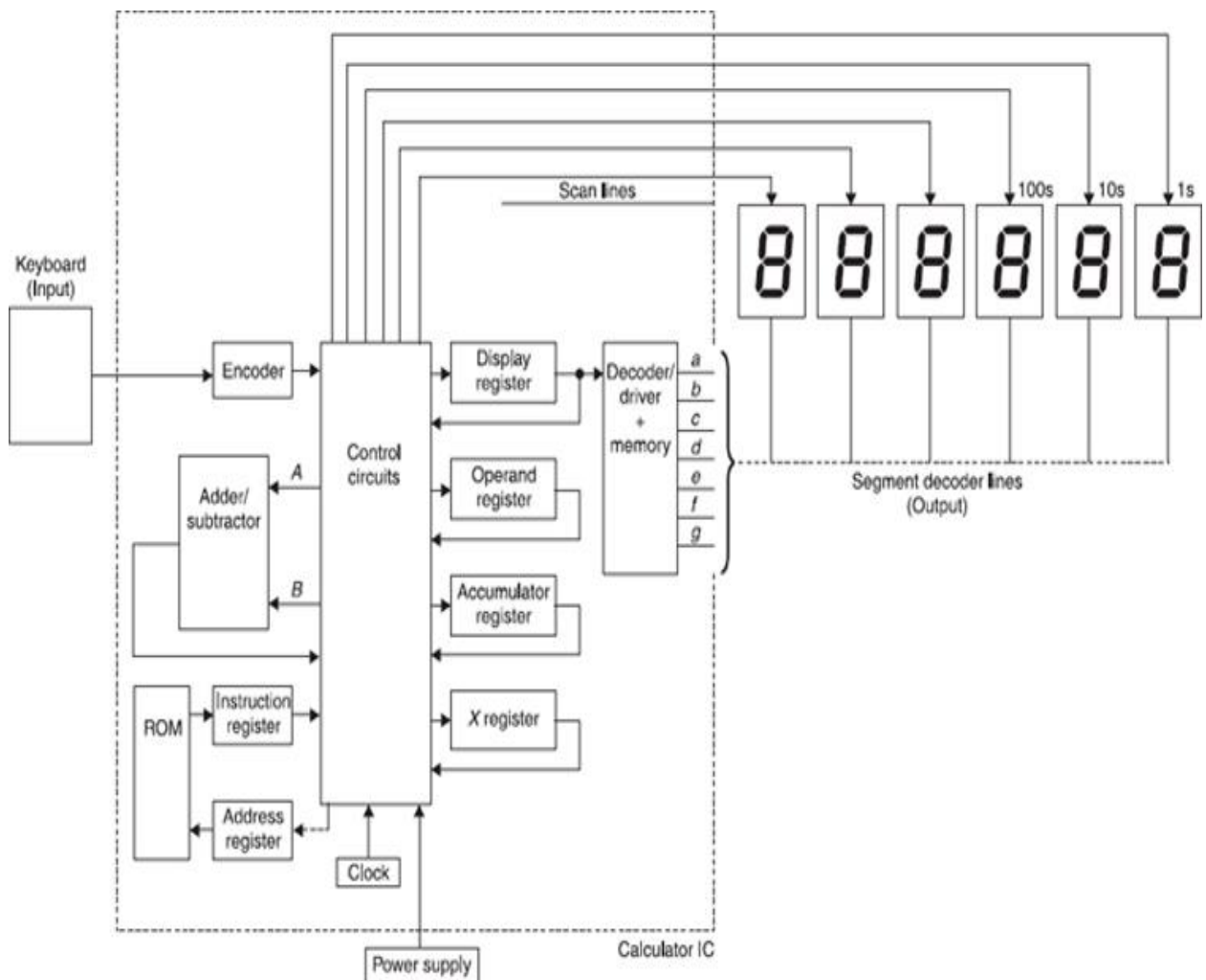
Key Board: It is an input device and contains normally open switches.

Seven segment display: It is an output device and figure shows 6 segment display.

Power supply: Most hand-held calculator use battery supply but many uses Solar cells.

Clock: It sends constant frequency pulses to all the parts for synchronization of all operations. The frequency range is from 25KHz to 500KHz.

Encoder: Encoder converts the decimal number into binary number



INTERNAL ORGANISATION OF A CALCULATOR

Decoder/Driver: The binary result is converted to decimal. The driver drives the display unit.

Rom: The steps to be followed in the calculations are program into Rom.

Instruction Register: It contains the instructions necessary for bigger numbers with directions in the instruction register.

Display Register: It stores the latest numerical data, which we input to the calculator.

Operand register: It stores the last but one numerical data, which we had put in the calculator.

Accumulator Register: The results of the arithmetic operations are stored in this register.

X-Register(Extra Register): It holds the sign of the arithmetic operation(+,-) in binary form.

Control unit: It controls all the operations in the calculator.

Working of Calculator:**To add $2 + 3 = 5$**

1. **when press the 2 on the key board:** The encoder translates 2 to a BCD 0010. and is stored in the display register. The output of display register is fed to decoder, where the seven-segment display lines are activated and display '2'.

2. **Next, we press + on the keyboard:** This operation is transferred and stored in code form in an extra register (X register).

3. **Now we press 3 on the keyboard:** The encoder translates the 3 to a BCD 0011 and is stored to the display register and is passed to the display decoder/driver which also places a 3 on the display. Meanwhile, the controller has moved the 0010 (decimal 2) to the operand register.

4. **Now we press = key:** The controller checks the X register to see what to do. The X register says to add the BCD numbers in the operand and display registers. The controller applies the contents of the display and operand registers to the adder inputs. The result (BCD 0101) is stored in the accumulator register & routed to the display register, shown in the readout as 5.

Differentiate between Calculator and Computer

Calculator**Computer**

1. It is a specific purpose device.

1. It is a generic purpose device.

2. It performs Mathematical operations.

2. It performs both Mathematical & logical

operations

3. It requires low power

3. It requires large power

4 .It has a Temporary memory .

4. It is has a temporary and Permanent
memory

5. Calculator cannot be used for
Communication purposes.

5.It can be used to send messages, email,
text ,Video Chatting

6. It cannot support Graphics

6. It Can support Graphics

7.Small in size ,light weight ,handheld
& portable.

7.Large in size & heavier in weight.

8 .Memory is in the form of Reg only.

8. Its Memory is large & is in the form of
RAM, ROM,HDD.

9. Computer Cannot be used with Gadgets

9. Calculator can be support gadgets. like
Pen drive, Speakers, Printers, Projector.

10. Calculator shows only Numbers.

10. Computer screen can show Images
Video and Number.

MICROWAVE OVEN:

Principles of Microwave cooking or oven

- *The microwave oven uses 2.4GHz of frequency to cook food.
- *Microwaves are non-ionizing, high frequency short wave length electromagnetic waves.
- *Microwaves are attracted by the moisture in the food placed within the oven for cooking
- *The microwaves penetrate the food surface causing the moisture molecules to vibrate.
- *This vibration generates heat which cooks the food by conduction.
- *In microwave cooking the food is cooked from outer surface to the inner core.

Block diagram of Microwave Oven:

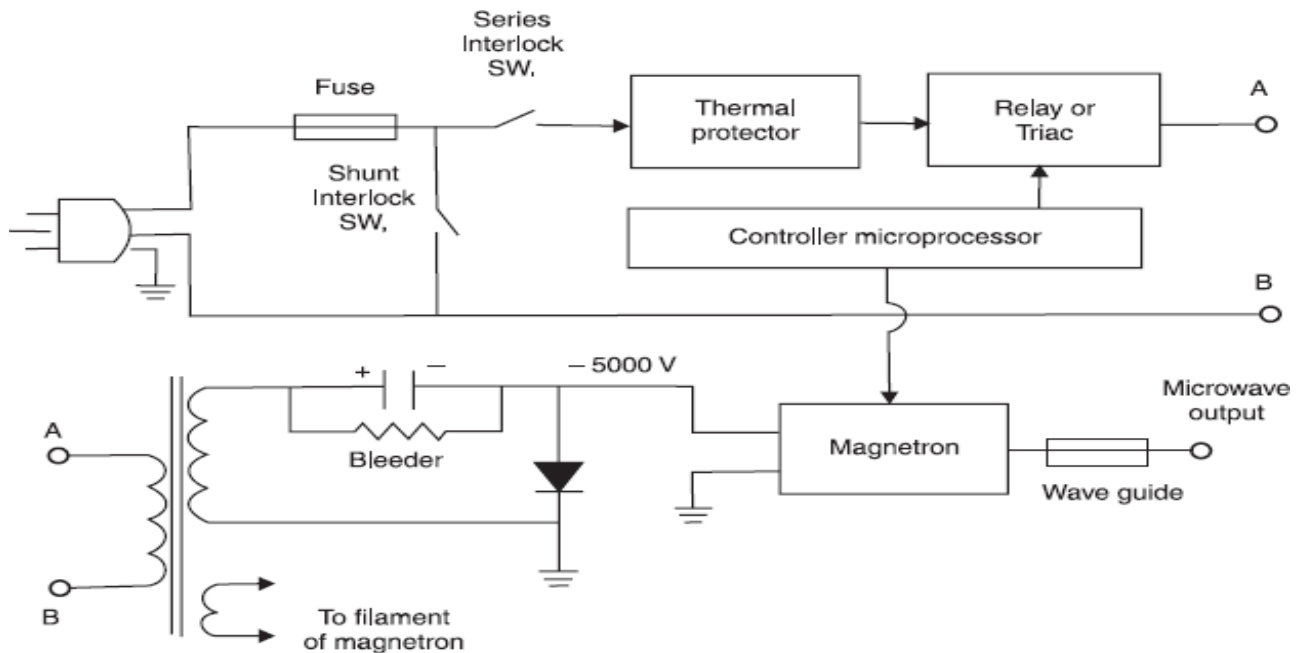


Fig shows the block diagram of a microwave oven.

Power supply: The mains plug and socket are three-pin earthing type. A 15 A, 250 V fast blow ceramic fuse is used. *Interlock switches are linked with the oven door.* Power will be applied to the mains transformer only when the oven door is closed. At least one interlock switch is in series with the transformer primary, hence even a spot of dirt in the relay or trial, cannot turn the oven on when the door is open

There is yet another interlock across the power supply line. It normally remains open. If the door alignment is not correct it will be activated, putting a short circuit (*crowbar*) across the line and making the fuse to melt.

Transformer:

The voltage induced in the secondary winding is about 2000 V (rms) at 250 mA for normal *domestic ovens*. The transformer also has a tertiary winding for the magnetron filament. The *high voltage return circuit* is fastened directly to the chassis through the transformer frame. A *half-wave doubler* is used for the rectifier, with a peak inverse voltage of about 12000 V. One end of the diode is connected to the chassis.

Bleeder, Resistor and capacitor:

The *bleeder capacitor* (1 μ F) should always be discharged before touching anything inside when the cover is removed. The high value *bleeder resistor* is slow to discharge further it may be open.

Thermal protector: It is a PTC thermistor. The primary current decreases when the temperature rises abnormally. It senses the temperature of the magnetron as it is bolted to the magnetron case and is so connected electrically that its resistance comes in series with the primary circuit.

Microprocessor: The *controller* is a microprocessor chip with a clock. It is activated by key-pad switches and sets the cooking time. It senses the temperature and moisture, sets the power levels and runs the display. There are three power levels.

1. High Power → the microwave generator remains *on* continuously.
2. Medium Power → the microwave generator remains *on* for 10 seconds and *off* for 10 seconds.
3. Low Power → the microwave generator remains *on* for 5 seconds and *off* for 15 seconds.

The controller activates the microwave generator using either a relay or a triac.

Magnetron: It is an oscillator which generates microwave frequency under the influence of external magnetic field.

Waveguide: It is a hollow conductive metal pipe used to carry high frequency microwaves.

Types of Microwave Ovens

Based on their size

1. Compact Microwaves
2. Mid-size Microwaves
3. Full-size Microwaves

Based on method of cooking

1. Cooks by microwave only.
2. Microwave convection oven.

OR

There are three types of microwave ovens:

1. Solo 2. Grill 3. Convection.

Solo microwaves are considered basic or entry level,

Grill microwaves are considered the next step up,

And Convection microwaves *are at the top.*

The main difference between the three are included features, watts, and price.

Types /Lists of Microwave devices & their applications

1. **Klystron amplifier** → Tv transmitter, Radar, Earth station, Transmitter.
2. **Reflex klystron** → Local oscillator in microwave receiver ,FM oscillator in portable microwave links.
3. **Magnetron**-→ Microwave Radar, sweep oscillator in telemetry and in Missile, Industrial heating, Microwave ovens.
4. **Travelling wave tube**-→ Satellite communication, military, Air borne & ship borne, Radar, CW Radar and ECM.
5. **Wave guide**→ Microwave transmission, Radar transmitter and receiver.

Microwave Semiconductor Devices

1. **Schottky Diode**-→ Switching, mixing, signal detection at low levels.
2. **Varactor Diode**-→ Frequency multiplier.
3. **Gunn Diode**-→ Local oscillator in receivers & frequency in transmitter.
4. **Tunnel Diode**-→ Low power microwave oscillator.
5. **IMPATT Diode**-→ Parametric amplifier, parametric oscillator , CW Radar.

WASHING MACHINE:

Definition: It is a machine used to wash various types of clothes without applying any physical efforts. With washing machine donot have to rub the clothes with hand or squeeze them to remove the water from them. Working principal of Washing machine.

**Working principal of Washing machine:**

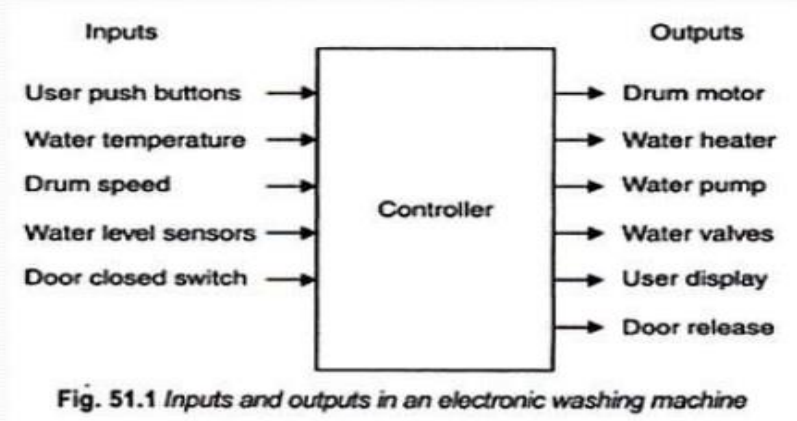
Principle of washing machine

The washing machines are very commonly used electronic controlled home appliances. Modern washing machines are fully automatic. That is, they wash the clothes according to their type and degree of dirtiness. The washing machines also detect the type of clothes and then select the programs for washing. The modern washing machines use microcontrollers or microcomputers with sufficient memory and keyboard/display etc facilities. The modern fully automatic washing machines use the advanced control techniques like fuzzy logic to implement washing algorithms. Such washing machines decide wash cycle, hot/cold water requirement, agitate/spin/soak/rinse wash modes, wash times etc on their own depending upon the volume of clothes and their dirtiness.

Prepared By: D. Y. Vankawala

Electronic controller of washing machine:

Washing Machine (Various inputs and outputs in Washing Machine)



Prepared By: D. Y. Vanikawala

Inputs

- **User push button:** These are various buttons used for the interaction with user.
- **Water Temperature:** The temperature sensor senses the current temperature of the water and give this temperature as an input to the controller.
- **Drum Speed:** Current speed of drum is sensed and this input is also given to the controller.
- **Water Level Sensor:** this input gives current temperature of the water.
- **Door close switch:** it is used to sense whether the door is closed or not.

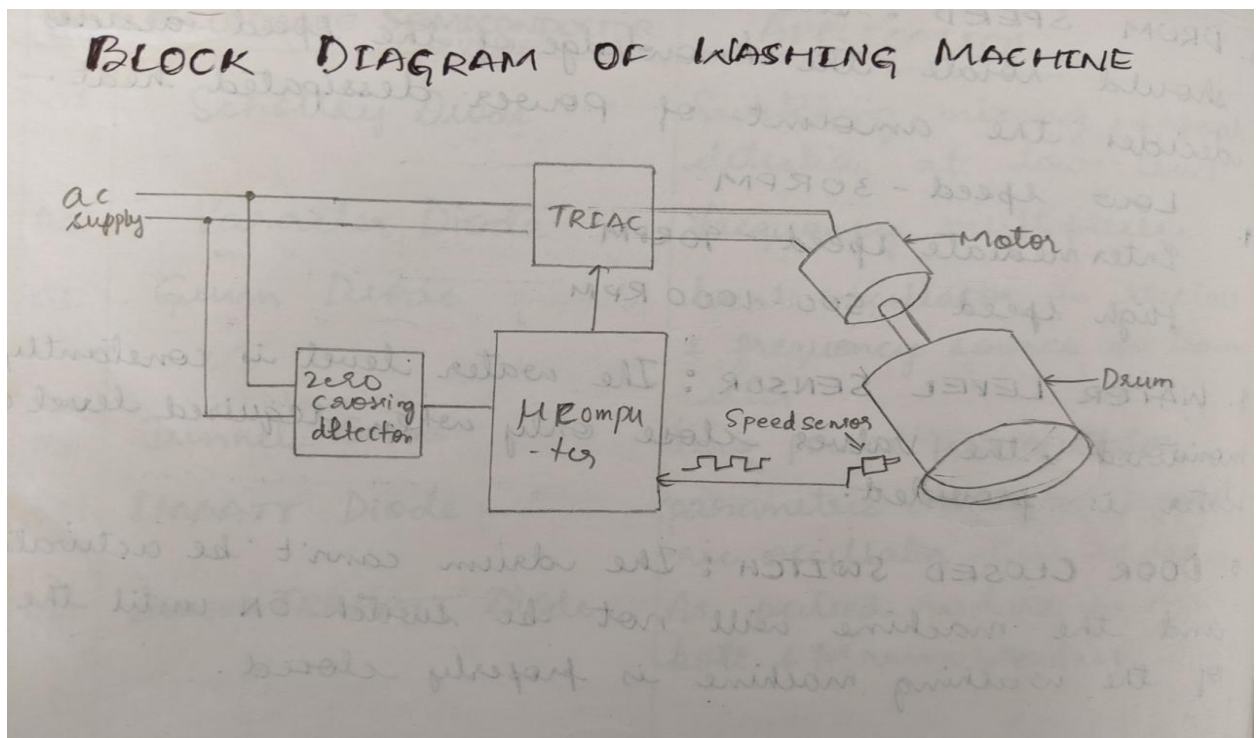
Prepared By: D. Y. Vanikawala

Outputs

- **Drum Motor:** It is connected with the washing machine drum and it is used for rotating drum.
- **Water Heater:** This signal is the output from controller and input for water heater which is used to switch on or off the heater.
- **Water Pump:** This signal is used to control the water pump of the washing machine.
- **Water Valves:** This signal is used to open or close the water valve of washing machine.
- **User Display:** It indicate the current ongoing activity and other signals related to washing machine.
- **Door Release:** It is the signal for releasing the door for washing machine.

Prepared By: D. Y. Vankawala

Block diagram of washing machine:



Micro computer: The modern washing machine use micro computer to control various functions. micro computer selects the required program as it is set by the user.

The micro computer first checks the safty cut-out is in ON position and then enables the desired programs.

TRIAC: The power can be controlled by firing the triac at appropriate time. The motor power is find by timing of triac firing pulse.

Zero crossing detector: To fire the triac at appropriate time, the controller must detect the zero crossing point of AC signal which protecting the processor from high voltages. Here Zero crossing detector circuits is used.

Drum: The drum is the place where the cloths are loaded. The motor speed determines the rotation of the drum.

Low speed -- 30RPM

Intermediate speed – 90RPM

High speed – 500 - 1000RPM[For spin dry]

Motor: Motor is connected to the drum, the power is determine by the timing of the triac firing pulse. The speed of the motor will be controlled by the power dissipated it.

Concept of Fuzzy logic:

Fuzzy logic is an approach to computing based on "degree of truth" rather than the usual "true or false"(1 or 0) Boolean logic used in computer.

Fuzzy logic improves zero and one has extreme cases of truth that also includes the various states of truth in between.

Ex: Results of a comparison between 2 things could be not "clean or dirty" but 75% clean.

OR

Fuzzy logic washing machines are gaining popularity. These machines offer the advantages of **performance, productivity, simplicity, productivity, and less cost**. Sensors continually monitor varying conditions inside the machine and accordingly adjust operations for the best wash results. As there is no standard for fuzzy logic, different machines perform in different manners.

Typically, fuzzy logic controls the washing process, **water intake, water temperature, wash time, rinse performance, and spin speed**. This optimises the life span of the washing machine. More sophisticated machines weigh the load (so you can't overload the washing machine), advise on the required amount of detergent, assess cloth material type and water hardness, and check whether the detergent is in powder or liquid form. Some machines even learn from **past experience, memorising programs** and adjusting them to **minimise running costs**.

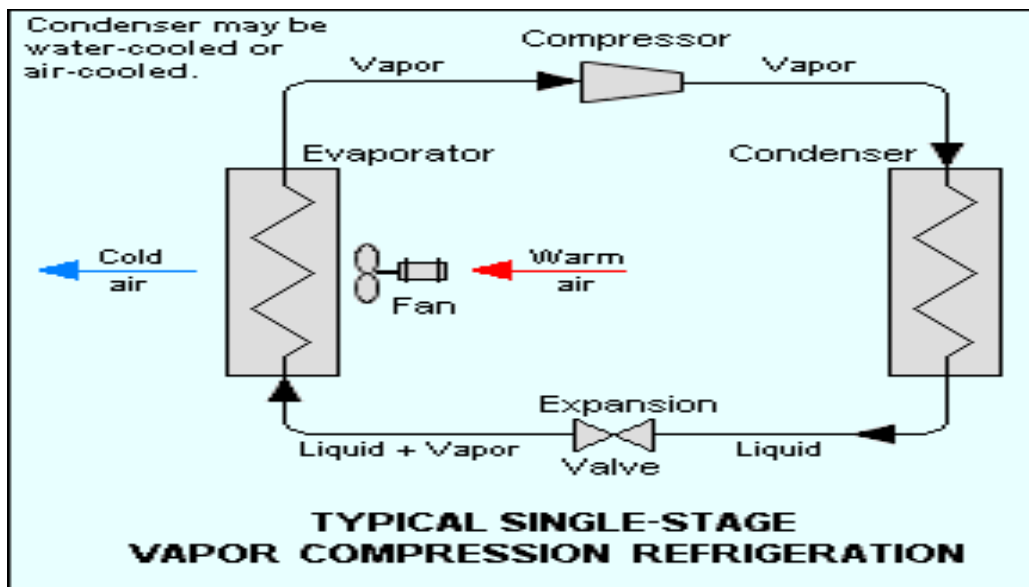
Application of Fuzzy logic in Washing machine:

- Fuzzy logic controls the washing process such as water intake, water temperature, wash time, rinse performance, spin speed.
- Sensors continuously monitor various conditions inside the washing machine and accordingly adjust operations for the best wash results.
- Washing machine with Fuzzy logic offers the advantages of performance, productivity, less cost & simplicity.
- More sophisticated washing machines weigh the load, advise on the required amount of detergent, assess cloth material type and water hardness and check whether the detergent is in powder or liquid form.

Refrigeration:

Definition: It is a process of extracting the heat from the substance at a temperature lower than the ambient temperature, the extracted heat is then transferred to atmosphere at a temperature higher than the ambient temperature.

Block diagram of Refrigeration:



The refrigerant circulates through piping and equipment in the direction shown in figure

1. At point 1, the refrigerant is in the liquid state at a relatively high pressure and high temperature. It flows through a flow control or expansion device. At point 2, the refrigerant is at a very low pressure and low temperature, due to low pressure a portion of refrigerant is now in vapour form.
2. Now the refrigerant flows through evaporator where it flows from fridge to refrigerant.
3. The contents inside the refrigerator are at a relatively low temperature than that of refrigerant. Now the refrigerant absorbs heat, producing cooling effect inside fridge. Now the refrigerant boils and converts into vapour because of the heat it received in evaporator.

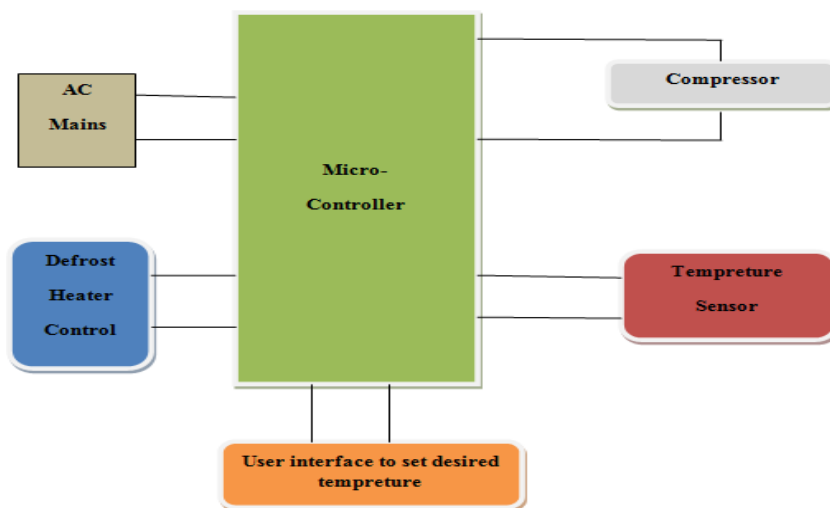
4. Leaving the evaporator, the refrigerant is a gas at a low pressure and a relatively low temperature. In order to use refrigerant again, it must be brought back to a liquid at a high pressure, which is achieved by passing it through a compressor.

5. Leaving the compressor, refrigerant is now at high pressure and high temperature in vapour form.

6. To change refrigerant into liquid, heat should be removed from it. Now refrigerant is passed through a condenser where the heat from refrigerant flows to air converting the refrigerant into a liquid at high pressure and high temperature.

7. The refrigerant has a return to its initial state 1, and the above steps are repeated for refrigeration.

Role of Electronics in Refrigeration:



To overcome the disadvantages of the mechanical control the electronic control system has introduced. It uses microcontroller which works as brain of the system and runs as per the logic implemented. Electronic control system consists of as said μC , Temperature sensor, User interface (UI) i.e. knob or keys and program logic [2]. Fig shows Electronic control of HVAC system With the implementation of this system we can go for different defrost algorithms depend on the uses pattern which ultimately results in the saving of the

energy. System operation can be made whether/Environment friendly by sensing the ambient temperature which made system more smart and superior.

Applications of refrigeration

- a) Food processing, preservation and distribution
- b) Chemical and process industries
- c) Special Applications such as cold treatment of metals, medical, construction, ice skating etc.
- d) Storage of Raw Fruits and Vegetables
- e) Meat and poultry
- f) Dairy Products like milk, butter, buttermilk and ice cream.
- g) Beverages: Production of beer, wine and concentrated fruit juices require refrigeration.
- h) Candy: Use of chocolate in candy or its coating with chocolate
- k) storage life of some plant and animal tissues at various temperatures.

Air Conditioner:

It is the process of treating air in an internal environment to establish and maintain required standards of temperature, humidity, and cleanliness and motion.

Types of Air Conditioner:

- 1) Window air-conditioning system
- 2) Split air-conditioning system
- 3) Centralized air-conditioning system
- 4) Package air-conditioning system

OR

Five Types of Air Conditioners are

1. Window Air Conditioners



Window air conditioners are self-contained units that are typically placed in a window. They can also be installed by creating a hole in an exterior wall of a room. Window air conditioners are most useful for apartments and single-level homes.

2. Air Source Heat Pumps



Air source heat pumps are an energy efficient and low maintenance cooling solution for homes that have ductwork. The installation cost of air source heat pumps can be high, but the running and maintenance costs are low.

3. Central Air Conditioners



When it comes to **air conditioning systems**, central air units are considered the most luxurious because they are able to cool each room in your home simultaneously and do so quietly. They are made up of two units: the condensing unit that is located outside the home and the evaporative unit that is located next to the furnace. The two units are connected to each other through refrigerant tubing.

From our perspective, a **central air conditioning system** is the absolute best way to evenly distribute cool air throughout a home..

4. Ductless Air Conditioners



Ductless air conditioners, also known as a split system or mini-split systems, are a common cooling solution for apartment dwellers or homeowners with no ductwork in their homes, who are looking for a more permanent cooling solution than window air conditioners.

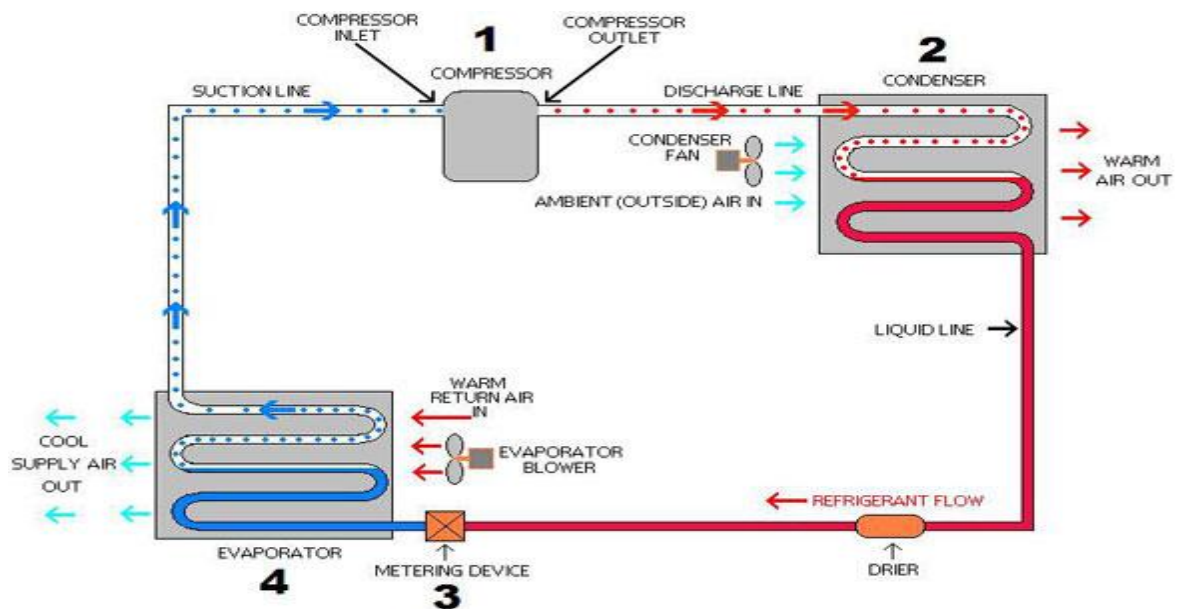
Ductless air conditioners are comprised of two small air conditioning units that can be installed on the interior walls of your home. Refrigerant tubing connects the two systems by passing through the walls that separate them.

5. Portable Air Conditioners



A portable air conditioner is a single self-contained unit that can be wheeled into a room and positioned on the floor. Hot air is discharged by a hose vent through an exterior wall or window. Portable air conditioners tend to be noisy, but they are a good temporary cooling solution.

Block diagram of Air Conditioner:



The component at #1 in this air conditioning circuit and cycle

diagram is the compressor. The compressor is the heart of the system; it keeps the refrigerant flowing through the system at specific rates of flow, and at specific pressures. It takes refrigerant vapor in from the low pressure side of the circuit, and discharges it at a much higher pressure into the high side of the circuit. The rate of flow through the system will depend on the size of the unit, and the operating pressures will depend on the refrigerant being used and the desired evaporator temperature.

The component at #2 in this air conditioning circuit and cycle diagram is the condenser.

The red dots inside the piping represent discharge vapor. The solid red color represents high pressure liquid refrigerant. Most air cooled air conditioning and refrigeration systems are designed so that the refrigerant will condense at a temperature about 25 to 30 degrees above outside ambient air temperature. When the hot refrigerant vapor discharged from the compressor travels through the condenser, the cool air flowing through the condenser coil absorbs enough heat from the vapor to cause it to condense.

If the outside air temperature is 80 degrees, the system is designed so that the temperature of the refrigerant, right at the point where it first condenses, will be about 105 to 115 degrees.

At this stage in the air conditioning circuit and cycle diagram, high pressure liquid refrigerant will flow down the liquid line, through a filter drier that is designed to prevent contaminants from flowing through the system, and on to the metering device.

The metering device, component #3 on this air conditioning circuit and cycle diagram, is the dividing point between the high pressure and low pressure sides of the system.

And is designed to maintain a specific rate of flow of refrigerant into the low side of the system. When the refrigerant passes through the metering device, it drops from about 225 psi to about 70 psi ,It also drops in temperature from about 110 degrees to about 40 degrees ,It starts evaporating immediately ,And it wouldn't be too inaccurate to imagine it acting like warm soda when you shake the bottle and pop the top off.

It shoots out into the evaporator foaming, bubbling, and boiling, And remember, it's at a low pressure, so it's only boiling at about 40 degrees F.

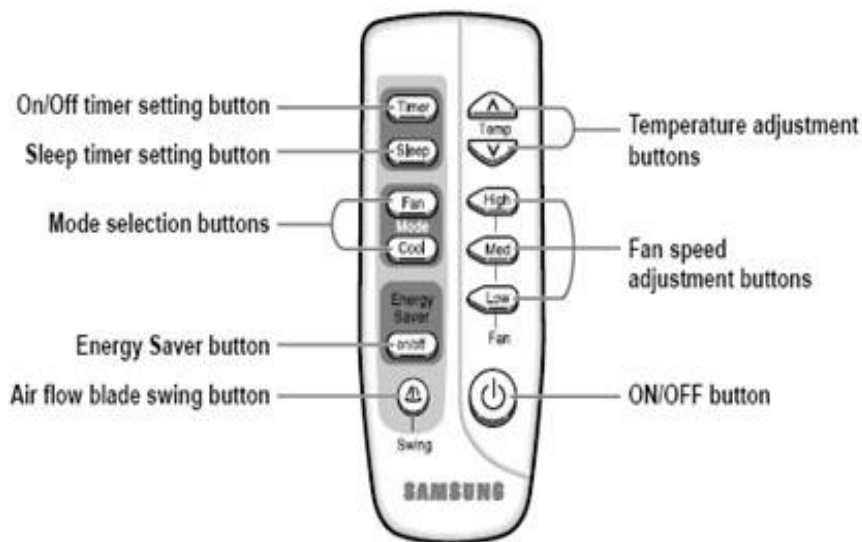
And that brings us to the evaporator, component #4 in the air conditioning circuit and cycle diagram.

There will be relatively warm air flowing over the evaporator coil, lets say about 80 degrees.

The air condition system is designed so that the refrigerant will evaporate in the evaporator at a temperature of about 40 degrees, so that it will be cold compared to the warm air flowing over it. The system is designed so that the heat in the warm air flowing over the evaporator will be absorbed by the cold evaporating refrigerant.

This cools the air flowing over the evaporator, and is the reason cold air blows out of your air conditioner.

Remote controlled Air conditioner:



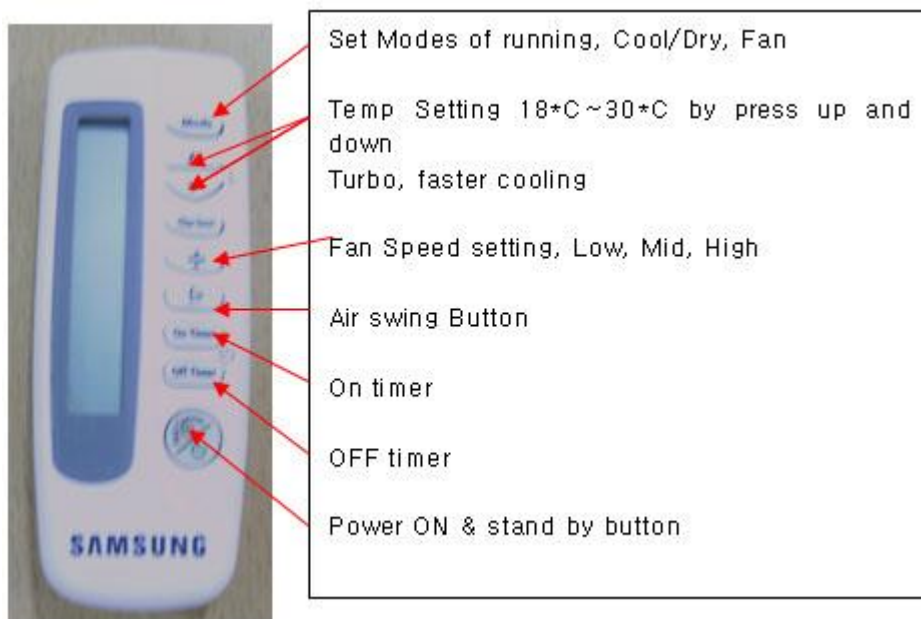
Step 1. To start using the air conditioner, press power **ON/OFF** button.



Step 2. Press **Mode** button to set **COOL**.



Step 3. The functions of each button on the **remote control**.



Applications of Airconditioner:

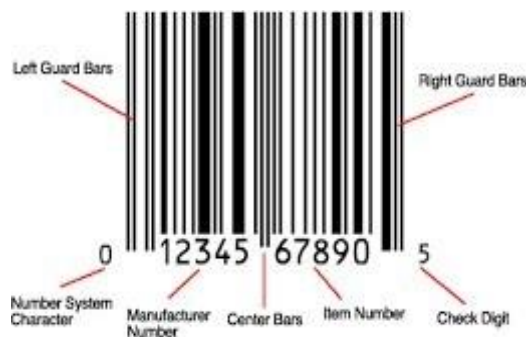
- 1.Used in Houses, Hospitals, offices
- 2.computer centres, , departmental stores
- 3.Theatres.
- 4.Auditoriums.
- 5.Confrerance halls.

6. Restaurants.
7. Buses, Cars, Trains, aeroplanes and ships
8. Food processing
9. Textile industry.
10. printing industry.
11. pharmaceuticals industry.
12. tool room.
13. manufacturing industry.

Bar code and QR code:

Bar code:

- Bar Coding is a method of coding consumer products by combinations of bars of Varying thickness representing characters and numerals.
- A Barcode consists of a rectangular block of black and white lines cans of food, books extra.
-
- The black lines and white spaces tell a computer what the item is and the item cost.



- The bar code consists of data stored in horizontal direction only hence it is called one dimensional or linear code.
- These barcodes (UPC: universal product code) are read by optical wands or stationery in-counter readers.

QR code(quick response code):

A QR code consists of black squares arranged in a square grid on a white background that contains information about the item to which it is attached.

The QR code can be read by an imaging device such as camera and the QR code can be read by an imaging device such as camera and processed. The required Data is then extracted from patterns that are present in both horizontal and vertical components of the image.

**Comparison between QR code and barcode:****Barcode:**

1. Rectangular block of black lines and white spaces of varying thickness.
2. One dimensional Matrix barcode
3. Represented by combinations of bars of varying thickness.
4. Decoding can be done by using a light pen or optical or Digital scanner.
5. Mainly used in smart hospitals cinema theatres express malls etc...

QR code:

1. QR code consists of black squares are arranged in a square grid on a white background.
2. Two dimensional Matrix barcode.
3. Represented by square dots on a square grid.
4. Recording can be done by using a camera or optical scanner.
5. Mainly used in smart phone computers.

Office Automation: Copier, scanner and Printer

Copier(Xerox Machine):

A copier is a machine that makes paper copies of documents and other visual images quickly and cheaply.

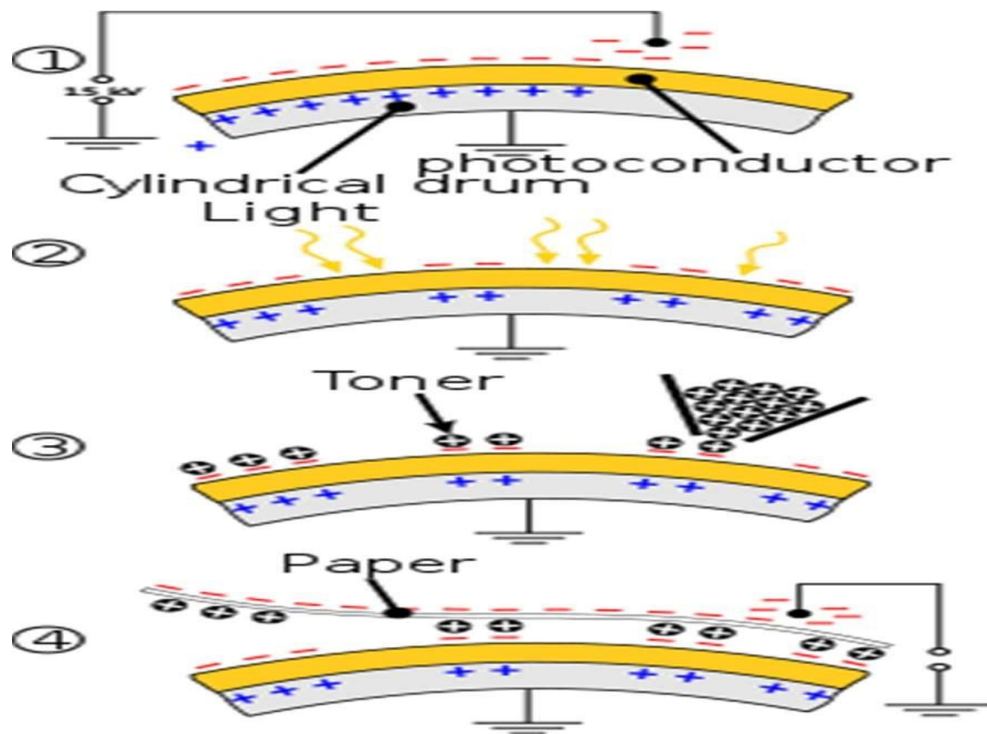
Working principles:

1. Photocopiers use a technology called xerography, an dry process that uses electrostatic charges to photo receptor to first attract and then transfer toner particles on to a paper in the form of an image. Heat pressure or of both is then used to fuse the toner on to the paper.
2. Photocopy is widely used in the business, education and government sectors.



Working of Xerox machine

- More photocopies use a technology called xerography
- Xerography is a dry process that uses electrostatic charges on a light sensitive photoreceptor to first attract and then transfer toner particles and to the paper in the form of an image.



1. **Charging:** Silver color drum is electro statically charged by a voltage wire called a Corona or a charge roller. The drum has a coating of photoconductive material.

2. **Exposure:** A bright lamp illuminates the original documents the white areas of the original document reflects the light onto the conductive drum. Areas of the drum that are exposed to light become conductive and therefore discharge to the ground. The area of the drum not exposed to light (those areas that correspond to black portions of original document) remains negatively charged.

3. **Developing:** The toner is positively charged. When it is applied to the drum to develop the image, attracted and sticks to the areas that are negatively charged (black areas).

4. **Transfer:** The resulting toner image on the surface of the drum is transferred from the drum on to a piece of paper with negative charge than the drum.

5. **Fusing:** The toner is melted and bonded to the paper by heat and pressure rolls.

Applications of Xerox machines:

- 1.Used in various offices to duplicate the required documents.
- 2.Used in schools and colleges to copy notes and text.
- 3.A Copy be obtained by zooming in or zooming out various documents.
- 4.A computer can be directly connected to a Xerox to get printouts at cheap rate..
- 5.Several pages can be scanned automatically and can be saved. Prints can be obtained whenever they are required again.

Scanners:

An image scanner or just a scanner is a device that optically scans images , printed text , hand writing or an object and converts it into a digital image.

Commonly used scanner is a flatbed scanner where the document or object to be scanned is placed on transparent glass plane. A white light is focused on the object to be scanned and the intensity and color of light that is reflected back is stored in digital form .The qualifying parameter for a scanner is its resolution measured in pixels per inch (PPH) or samples per inch (SPI).



Printers:

A printer is a device that accept text and graphics output from a computer and transfer the information and to paper. Printers can be used to produce permanent physical documents and to the paper.

Types of printers

1. Dot Matrix printer: it prints characters as combination of dots. This will have a matrix of pins on the print head. Computer sends one character at a time to print it, there is a carbon between pins and paper. The characters or word gets printed on the paper when the pin strikes the carbon. The Matrix generally has 24pins.

2. Laser printer: it utilizes a laser beam to produce an image on the drum. The light of the laser alters electrical charge on the drum whenever it hits. The drum used then rolled on a reservoir of toner, which is picked up by the charged portions of the drum. Finally the toner is transferred to the paper through a combination of heat and pressure.

3. Inkjet printer: Prints characters by spraying patterns of ink on the paper from a nozzle or jet. Specially made ink is pumped out to create various letters and shapes from nozzles having very fine holes. The ink comes out of the nozzle in the form of vapours. After passing through a reflecting plate, it forms a desired letter on paper.



