



General Studies and Engineering Aptitude

For

ESE-2023 & 24

Information and Communication Technologies (ICT)

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- Cover complete syllabus and all topics of IES-2023 & 24.
- Cover all concepts and questions from the top 3 coaching institute class notes.
- Extra topics will cover in each subject if anything will be required in the future according to IES-2023 & 24 syllabus.
- Doubts and queries solution through dedicated WHATSAPP group.
- Career guidance and motivational support.
- Concise, concept oriented and topic wise presentation with detailed video lectures on Target IES YouTube channel.

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3.	E-governance
4.	E-education
5.	Latest development in I.C.T

1. TOOLS OF ICT

Information and communication technology is the technology which are used to transmit process store create display share or exchange information by means of electronics

Objective- 1 .formulating information system – Easy access to scientific facts

2. Interpretation of information
3. Information processing
4. Improve decision-making problem-solving abilities

- Good governance- for good governance ICT is needed

Ministry of information and communication technology: 3 departments-

1. Department of post
2. Department of information technology
3. Department of information technology.

In 2005- right to information act was launched under this a 2-way interaction between the government and the citizens start.

e-governance- 1. Information
2. Iterations (2 ways)
3. Transaction.

In 2006- NeGP (National e-governance plan): Background- Rajiv Gandhi DISNIC Program (District info system for national info centre)

NOFN (National optical fibre Network)

Under this program more than 20,000 Gram-Panchayat would be connected with broad band internet connectivity for communication among themselves and with state.

E-panchayat- 1. Kerala
2. Sikkim

In 2015- NeGP 2.0.

1. BNP (Bharat net project)

1. Project Loan-Google 2. White fi – Microsoft 3. Free basics - Face book.

BNP- under this project more than 2 lakh gram panchayat worlds be connected with broad band connectivity optical fibres world be use. Govt Has tied up with their company

1-Google-project loon
2-Microsoft-white fi
3-Face book-free basic(x)

BNP- Provide 100 Mbps speed in gram panchayats, School College, bus stops, railways etc.

Under BNP even individual can get connectivity on payment.

2. E.Kranti – To provide the govt related services at any time anywhere, on 24 hr. basis.

E-police. There will be a website/app acting as a platform where a police complaint can be filed. **2 Type data base-**

- (i) Active criminal in particular area
- (ii) Efficient police personnel- transfers & postings can maintained

E-court- There will be a website \ app where a court complaint can be fired. It is also possible to check the star of any case.

E-secretariat- To check and find out the related govt program online.

Tools of ICT- Post, Radio, TV & Satellites, Mobile and computer

(1) **Post-**Under digital India program the post offices is converted into e-post in which following provisions had been added.

- All post offices of India connect with internet so it is possible to transfer money from one post office to one the post office.
- The post offices can act as the alternate banking system
- The post offices provide e-stamp paper, where property birth & marriage registration can be done.
- Tracking of assignment is possible under e-post.

(2) **Radio-** Radio was launched after 1947 as “All India radio” It has 3 main agenda.

(i) **Agriculture** - “Krishi charcha” program started, is the longest-running program on radio in the world.

(ii) **Education-**“Gyan vani” program was started by IGNOU provide quality education, adapted by more than 8 countries including the USA.

(iii) **Health** –Radio focuses its compaining in health & companied for pulse radio Abhiyan & dots program For T.B.

Radio & e-government- the prime minister has started a program on the radio called “**Mann ki Baat**” This is a direct interaction b/w the government & citizen through radio.

▪ **Radio works on following rules**

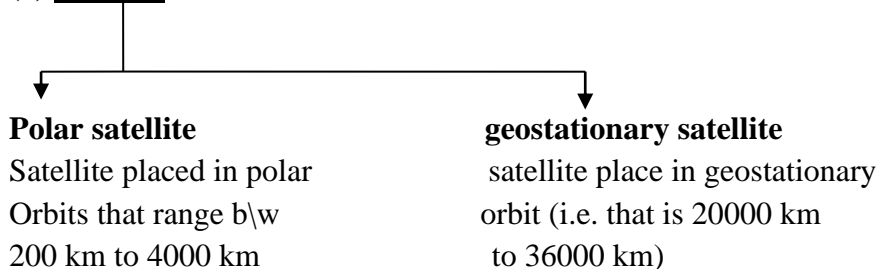
1. Higher the data content, higher is the energy of radio.
2. Radio user, **em** waves that has a frequency less than 2 GHz.
3. Radio works by the reflection of low energy wave from the ionosphere, and reaches any point on earth. At the broad casting station signals is modulated with amplitude and send towards iono spheres from there it gets reflected back which Is received by a radio town there & it gets reflected back which is received by a radio town & them spread in all direction.

Type of radio-

(i) **Satellite-based radio-** it is used for personal communication interdepartmental communication & it is used by security agencies railway defense etc.

(ii) **Web-based radio-** it is also called as digital radio The broadcast station pulse modulates the message signal with the carrier wave & it is then store in central server website or app on mobile acts as a radio web bases radio allow any time program & any where radio.

(3) Satellite



Application of polar satellite-

(1) Land mapping-

Cortosat 1A- Computerization of land records. Under this 2D image of the available land in India were made & 2 types of bills

(a) Landowner bill

(b) **Tenant bill** was launched together they are called as records of rights it gives data to the government for usable land.

Cortosat 1B –(a) PM Krishi sinchai yojana (b) Soil health card.

(a) **PM Krishi sinchai yojana-** provide irrigation facilities to former using soil health cart.

It will save water wastage agriculture and also it will help in reduction of the unnecessary satication for this another program ‘PER DROP MORE CROP’ is launched.

(b) Soil health card-

Through this the nutrient moisture content of soil up to 6cm longer can be obtained & data would be put in to –

1 physical form- given to formers

2 digital forms- available for government

Together they are called as soil health card. Using soil health card fertilized subsidies pesticides availability can be maintained.

Cartosat 2- Under this program per drop more crop drip irrigation and sprinkling irrigation facility would be provided through which the water management for irrigation can be done

(2) **Fisheries-** Presence of phytoplankton's is found by green dots in polar satellite images these green dots are not fixed but they keep on changing these position GOI developed a fishing app with help of satellite that gives location of fishes in the sea

(3) **For disaster management-** Polar satellite for disaster management was launched after Uttarakhand disaster in which many people were missed so Google launched a satellite SARSATT (search and rescue satellite) it will help in locating missing persons in disasters.

There was another program linked with SARSATT called khoyapaaya programm it is to find out the missing children from India was launched in collaboration with an NGO Bachapan bacho andolan.

(4) **For spying-** Polar satellite are primarily used for spying purpose & as it moves from north south north the polar satellite can map the would

Geostationary satellite-

(1) Tele communication- 1 Transponder 2. TV 3. VSAT

(2) Navigation- 1. GPS 2. IRNSS 3. GAGAN

- **Geostationary satellite** is placed above equator & have equal angular velocity to angular velocity of earth they appear stationary w.r.t any point.
- It can communicate equally in both the hemi spheres.
- The coriolis force is maximum at the poles & minimum at the equator due to which any satellite i.e. launched get aligned toward equator.

Application of geostationary satellites-

Transponders—Transponders are the devices in the satellite that responsible for frequency reflection on earth these transponders are provided by solar cells

There are different frequency bonds in transponders such as for mobiles, TV etc

The frequency division follows following radio.

(1) **Higher is the energy, higher is the data content**-Therefore radio user lower frequency & TV user higher frequency.

(2) **The size of the antenna is half of the size of the wavelength-** radio user lower frequency & higher wavelength so antenna size is larger.

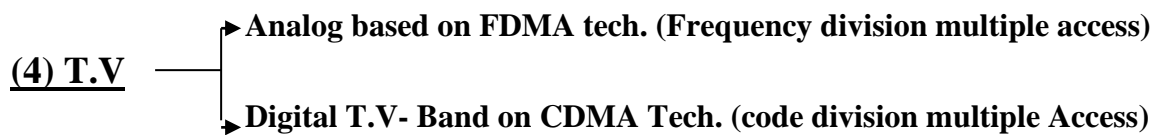
(3) **Higher is the energy of wave more are the chance of getting it corrupt.**

Therefore lower frequency wave are used in hilly regions & higher frequency are used at plane regions.

ITU (international telecom union) nomenclature-

(1) **L-Band** – 1 to 2 GHz– Big dish system (Radio)

- (2) **S-band** – 2 to 4 GHz- Big dish system (space commune)
- (3) **C-band** – 4 To 8 GHz- Meteorology (PSLV 25)-mom
- (4) **X-Band** - 8 & to 11 GHz – Mobile telephony
- (5) **Ku-Band** – 12 to 18 GHz – TV. VSAT
- (6) **K-Band** – 18 To 26.5 GHz – defense.
 - X Band is the most exploited band and frequency has exhausted in it.
 - Ku band has remaining frequency for mobile telephony in 4G, 5G etc.
 - The defense needs a higher range of frequency since it keeps on changing its frequency ranges.



(1) Analog T.V-

- The analog T.V. uses different frequencies for different T.V. Channel. for large no. of T.V. channels a large no. of frequencies are exhausted.
- FDMA tech uses frequency of the lower bandwidth so audio, video quality in it is not very good while the analog T.V uses ground towers to receive signals directly from the satellite, The T.V towers spread signal on earth through ground wave it has a range up to 50 km.
- The analog TV consumes large no. of frequency the audio, video quality is not good so H.D. TV IPTV are not portable in it.

(2) Digital T.V.-

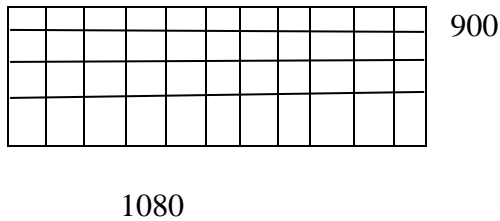
- A single frequency of higher bandwidth is given to multiple T.V channels. These channels together in a single frequency are called as a bouquet of channels.
- CDMA saves a lot of frequency since it uses the frequency of higher band width so audio, video quality in it is better.

Working of digital T: V-

- The mechanical signal of audio & video is converted into digital pulse & then it is pulse-modulated then these modulated signals sent to toward Satellite then satellite transmits it to **DTH (direct to home)** the antenna which is the size of 70 to 120 cm.
- HPTV & IPTV are for table in digital T.V.

The GOI made it compulsory for all TV channels to come to the digital platform & also to the user to use set up box, which is a demodulator that converts digital signal into an analog signal, so large number of frequency can be saved from Ku bond.

HDTV (High definition T.V)-



$1080 \times 900 = 10 \text{ lakh Pixels /inch}$

In HDTV is more pixel density per inch i.e. in an HDTV higher bandwidth given more detailing about the image & audio & it must be supported by higher pixel density which is achieved by more number of boxes in a unit area. Here boxes are LEDs recently quantum dot display use LEDs in nano form that can produce better image quality.

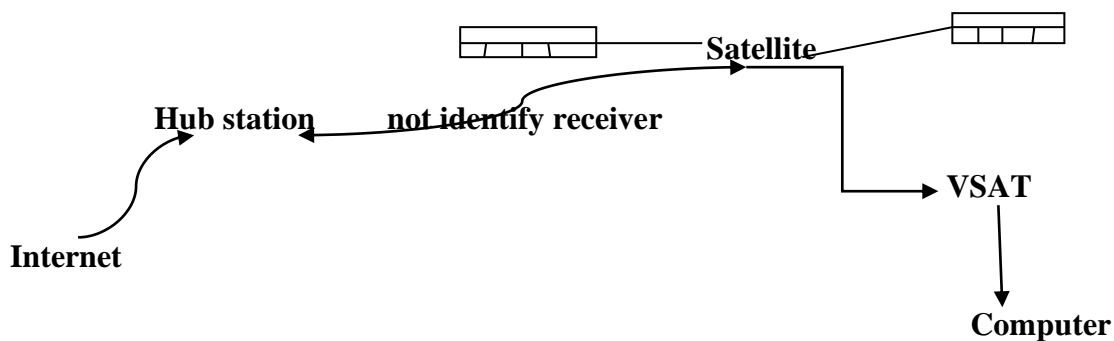
IPTV (Internet protocol T.V)

- It is a combination of TV, mobile phone & a computer on the same screen. It is a form of digital TV where all these applications are based on digital systems.
- Example** -Through apps such as GIO TV, Hot start etc. a mobile phone can act as a TV, here more & more digital platforms are brought on the same screen & It is called as digital convergence in the present case it is also called as triple-play service.

VOIP- (Voice over internet protocol)

It allow computer to computer call without Identification, It is not allowed in India but can be possible through apps such as what apps Viber, skype etc

VSAT (very small Aperture Terminal)



- A VSAT is a duplex system where incoming & outgoing both are possible
- VSAT antenna range from 70 to 120 cm
- It utilizes frequency in Ku band.
- The transmitter sent the signal towards the satellite can not identify receiver hence it sends the signal again to a hub station, the hub station identify receiver & sends the signal to the satellite from there it is sent again to-wards receiver.

Therefore, a time gap appears in initial communication started it remains continuous there are at least 3 satellites needed to cover the whole of earth & it does not require internet to operate but it can play internet itself.

- It is possible to visit in the post of any prog. Through VSAT, since the data is stored in a central server.

Application of VSAT

- Telemedicine
- Tele education
- Tele conferencing

Tele medicine- It provide quality health care at the rural areas, difficult areas & remote areas, under this the GOI collaboration with ISRO has launched specialized satellite under **SEHAT program**.

- For VSAT communication, community service centers (**CSC**) would be established at these areas & these service centers would have pathological test m/c, x-ray m/c etc. that would be controlled by remote by a doctor in a city hospital.
- Under SEHAT (social Endeavors for health & Tell medicine) the Ministry of health & family welfare has tied up with Apollo hospital & Medanta hospital to establish 60,000 such community service centers, It provide quality health & also to bring down high MMR (Maternal mortality rate) in India.
- In May 2017, ISRO launched south Asian satellite, It will help in providing VSAT facility to 7 SARC member (except Pakistan)
- South Asian satellite has transponders in Ku band and it will help in telemedicine teleconferencing & tell education in these counties.

Tele education- In this for secondary education VSAT based education was launched in Andra Pradesh & Chandigarh that has been highly successful & also in higher education the VSAT based system for was launched under a program called **NKN (national knowledge network)** in which more than 400 universities & colleges would be connected with brood bond internet connectivity to provide quality education from JIITs.

Tele conferencing- It is used by news channels, Govt agencies such as PM office & conference.

Navigation (1) GPS – (Global Positioning System)

- GPS is based on the principle of tri-lateration.
- GPS is a constellation of 24 satellites placed in
- Geosynchronous and geostationary orbits alternatively, where the satellite can communicate with each other & also communicate with a place on earth.
- The information passes from are satellite to another in the form of encrypted messages.
- At least 3 satellites is used for navigation in GPS. But for more accuracy 4 satellites are needed. The 4th satellite provided it better accuracy.
- The GPS system is inaccurate up to 20m for 3 satellites up to 10 m for 4 satellites (it is due to Larentzion contraction)
- The GPS system is used for navigation of automobile navigation of the ship, aircraft 4 it is also used by social media websites such as face book to track the activity of also by online games, e-commerce websites etc.

Geosynchronous orbit-

This orbit is b/w 10,000 to 20,000 km height it is placed in inclined orbit & also called as sun synchronous geosynchronous satellite used for navigation purposes.

Other global navigation systems are.

- (1) Russia- Glonass -30 satellites
- (2) USA – Galileo – 24 satellites
- (3) China – Beidou- 35 satellites

IRNSS (Indian Regional Navigation Satellite system)-

It is a constellation of 7 satellites out of which 3 are placed in geosynchronous orbit & 4 are placed in geostationary orbits.

Satellites in geostationary orbit have a unique motion in a figure 8 & they revolve around the common axis of geosynchronous satellites, it can cover a range of main boundary territory of India & also 1500 km beyond it.

It has an inaccuracy 10m, 5m

The IRNSS has 2 types of uses-

- (1) The standard use for civilian purposes & will be used for navigation of automobiles & ships.
- (2) Restricted use will be used for defense navigation.

The 7th satellite of series i.e. IRNSS 1G was launched in April 2016 & PM inaugurated it from Mauritius where named it as NAVIC (Navigation with Indian constellation), it is an autonomous regional satellite navigation system, that provides accurate real-time positioning & timing services.

(3) GAGAN (GPS aided geo augmented and navigation)

It is a joint venture b/w Airport Authority of India & ISRO. It has a constellation of 2 satellites. Out of which one is in geosynchronous orbit & other is in geostationary orbit.

This satellite communicates with an airport in India & also communicates with any Aero plan in Indian sky, It will help in safe flight take-off & landing in the difficult airport.

Note – In May 2017, GOI launched UDAN (Ude Desh Ka Aam Nagrik) It was launched to link smaller airports with large airports to bring these smaller airports into profit. Therefore smaller airport users linked with New Delhi airport.

Computers-

A computer is based on the concept of town planning & therefore, its terminology such as boot on, worm booting, cold booting, bootstrap loader, burnt etc. has been derived from town planning. In 1990, Intel launched processor that increased the speed of the computer by increasing its processing power.

Processing power- The processing power of the computer is its ability to perform as many names of switches together in a cycle. Therefore, processing power depends upon no. of switches.

1 Switch \longrightarrow 2 functions

8 switches \longrightarrow $8 \times 2 = 16$ functions = 1 bit

8 bits \longrightarrow $16 \times 8 \times 2 = 256$ functions = 1 bits

All the computer systems starting from very small computing devices up to very large supercomputer but in a super computer no. of processors are combine together in parallel called as parallel computing.

Example- 2 processors called dual core

8 processors called octo care etc.

In supercomputer millions of such processors are combined together in the parallel computer but they also have GaAs (Gallium arsenide) the chip that produces lesser heating than silicon bases chip.

Moore's law - The number of bits are constant in the computing world with the computing is increasing every year therefore after a large connection of programs in the computer world the number of bits requirements will be more & at that time when the availability of bits will be less than required bits than the computer the world will be earth.

According to Moore's every 2nd year the number of data becomes double and it requires the bit availability by half & therefore by 2024 the number of bits required will be more than the bits available & that will crash the computer world.

Therefore, quantum computing is the next generation of computing which is a combination of quantum physics & computer science.

Quantum computers-

- It uses the principle of digital computing but instead of switches here quates are used as a switcher. Here
- 1quantu is 1e
- 1e can have up spin or down ship
- Therefore, Increasing or decreasing =1 b/w decreasing and increasing=0

The processing power increase exponentially while in digital computing the processing power increase by **geometric progression**. Therefore, a single chip in quantum computing can perform billions of functions together. So, they can act as a supercomputer & size of the supercomputer will we the size of a mobile phone.

The advantage of quantum computing over simple computing is that a quantum computer can perform the functions involving prime number very will & very fast also in Internet of things, quantum computing will be able to analyze big data.

In quantum computing, the digital digits of bit & bytes are replaced by Qubit (quantum bits) Quantum computing is more accurate than simple computing because have the energy at the quantum level does not affect the quantum particle. Therefore, data Antoine & analyzed through quantum computing will be more accurate.

Quantum computing uses superposition and entanglement

Supercomputers- A supercomputer is every advanced computing system that can perform billion of functions together, therefore a supercomputer can be used in nuclear reaction missile launching, whither forecasting, also in high energy particle studies.

Fastest of world-

- (1) Sunway Taihulight (China)
Speed – 93 Peta flops.
1 Peta flops = 10^{15} floating-point/sec
- (2) Tianhe (II) (china) -33 Peta flops.

Fastest of India-

1. SERC-CRAY-0.6 peta flops

This supercomputer is kept at Indian Institute of science for research collaboration under the program NKN (National knowledge not work)

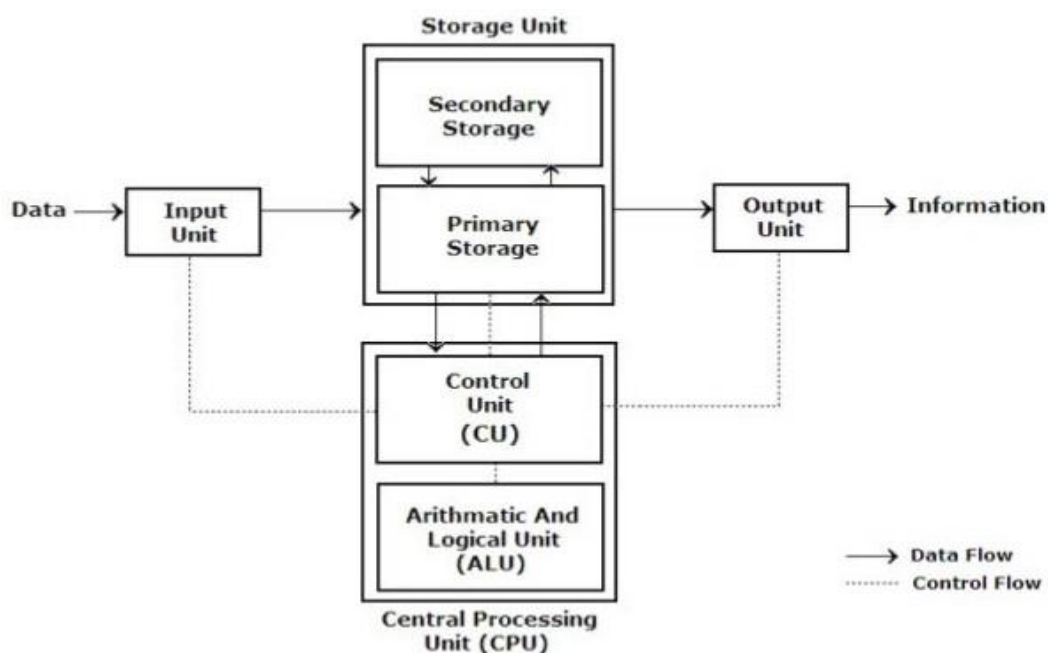
2. Aaditya CRAY -0.56 peta flops it is used by ISRO for its Aaditya mission.

3. PARAM Yuva -(II) 0.5 Peta flops (CDAC)

It will be used for pharmaceutical research and it will reduce the pharmaceutical research and development time from (20 to 30) year to (2 to 3) year.

In India after 2008 CDAC partnered with CRAY computing to develop its own supercomputer, ministry of science & tech under national innovative council has formed a national supercomputing mission that has a target to develop so supercomputers by 20, 30 out of these some of them will be in top 500 supercomputers of the world.

Computer: - Block diagram of computer



Input unit:

(1) **Keyboard-** A keyboard contains a matrix of switches (one switch per key). The wireless keyboard is Bluetooth enabled.

(2) **Mouse-** A mouse generally has two buttons & it may or may not have a wheel. Mouse when kept on a surface it divides the surface into x & y co-ordinate as the heavy ball in it rolls & changes the x-y co-ordinates portion. For the function less, surface mouse did not move.

The optical mouse contains a very small camera light device that takes multiple pictures of the surface at some time. As the mouse image changes & cursor also moves.

(3) **OCR (optical character radio)-** OCR is of many types such as a barcode. or code, hoper graphic storage.

Barcode- It is an alternative thin & thick line combination of black colour bar on a white background Bar code consists of a 13-digit number that gives information such as the origin of the product, type of product, expiring data etc.

The barcode reader has a high-intensity light in the red color wavelength, when this light falls on the bar code the black bar absorbs some light & white surface reflects this light, this creates a pattern of bandwidth where info. About the product is contained

OR code- (quick suspense code)- It is a 2d block colored thick line image on a white background. When an OR code is scanned the reflected light through white background has a higher bandwidth hence it can contain some information image or even a video is produced.

(1) **Paytm QR code** – It is a money transfer app in OR format that identifies the user & merchant, the money has to be deposited in an OR code account, RBI permission is not required in it,

(2) **Bharat QR code-** Developed by GOI NPCI (national payment corp. of India) It is an interbank money transfer & there is no need to deposit money in a QR code account. It identifies the user & merchant bank account, RBI permission is required in it, but in Bharat OR code post-transfer permission is given.

(3) **Holostone-** Holostone is an optical storage device that creates static or movie image where the light falls on it, it may be 3D image storage system in OR code or it may be even a 2D storage system also.

It is an advanced holo graphic image OR code creating an image of a product an old park such as Jurassic park.

Virtual reality- It is a reality in a virtual form that does not exist. It can be seen using a specialized device & when this device can produce an image in 360 views, it is mostly used for gaming or in movies.

Augmented reality- Augmented reality is a virtual image that can be filled or given an appearance of reality. Ex. Holostone or holographic image etc. These products such as Google glass that can produce a virtual reality.

MICR (Magnetic ink character reader)- It is used in the banking system where checks have magnetic ink code on it when the checks are put into the reader the information obtained are home branch account no. & also the authenticity of the checks.

The light pen- It is a pointer device; the light pen consists of a photocell mounted in a pen-shaped tube. The light pen is used to draw the image on the screen.

Micro phone- through microphone we can send sound input to the computer.

Digital camera- Use to recording films.

Output devices-

(1) LCO (liquid crystal display)

It consists of 2 panels & b/w them there is one plasma membrane panel. The plasma are solid at lower temp & behaves like a liquid at higher temp, they radiate when heated. The LCD screens contain the heating & lighting device at the back of panel when plasma is heated they radiate & produce image at the grid pattern screen.

It is also based on heating; therefore, it created a problem of screen burn, therefore screen savers are used to saving the screen. It consumes more electricity the image quality cannot produce HD quality & IPTV is not possible in it. Each tiny cell of liquid crystal is a pixel.

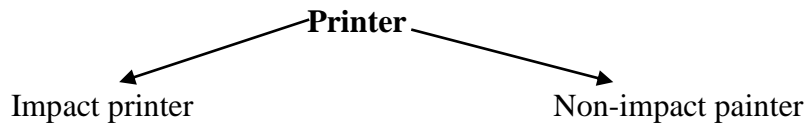
(2) The LED (Light Emitting diodes)

It consists of a single screen and on LED panel behind it, It contains only one screen, their fore-screen blackening beyond 120; does not happen in it. The LED is more durable consumes very less electricity and it can be converted into very small size bulbs, therefore. HDTV, IPTV, quantum dot displays are possible in it. In LED TV no heating is produced therefore it does not experience screen burn.

(1) Touch Screen

Capacitive touch- It consists of a single screen which is connected with battery so that battery can provide charges to it, therefore capacitive touch screen is completely charged if it is touched at any point, charges transferred in body & it creates potential difference area at that point & each point where potential difference is created is associated with a command. Its response is very quick hence it is called an instant touch.

Resistive touch- It consists of 2 screens the top screen is only a protective layer while the bottom screen is a highly sensitive screen. This sensitive screen notes pressure differences when pressure is applied to the top layer being a stick, the pressure gets transferred to the bottom layer & with each point, the command is associated. Its Response is not instant & sometimes can produce the wrong command; also, the image quality is not very good. But it is used in ATM m/c defence equipment etc.



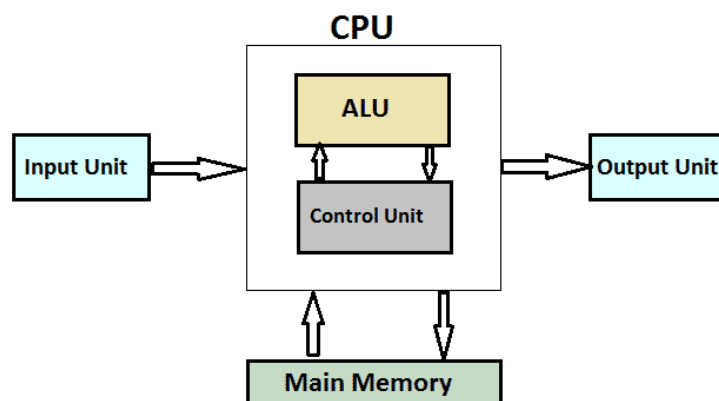
Impact printer – It is based on type writer technology i.e. there is a physical contact b/w the paper & printing head, in this, there are fixed alpha numeric characters that can be printed. 2n/c bloats images quality is not very good & the pointing is very slow. Most famous impact printer was the dot matrix printer, in which there was an inked ribbon b/w the paper & printing head & in place of printing heat it was replaced by pins when the pins pass through the ribbon. it gets ink on its tap & strike on the paper in the form of a matrix of dots. The printing became faster, image quality better & also it was cheaper to use.

Non-impact printer- It is based on photocopy m/c technology where there is number contact b/w the paper & printing head.

- The ink is guided by electrostatic forces and then it is dried using a heater.
- Image quality in it is better & printing is faster.
- Non-alpha numeric character can also be printed.
- The most famous non-impact printer is inkjet printer but recently laser printer that is based on electrostatic guiding of ink and loses is used to strike the solid ink on paper. In this image quality is better & cost of printing is low.

3D printers – They manufacturing machines and it manufactures anything by layer by layer of the deposition of the particles. It can manufacture very fast & width more precision, the manufacturing by 3D printers is of highly accurate quality & chances of error in it are least, it will lead to work automation & manufacturing revolution.

Control processing Unit (CPU) – Micro procession – It is brain of computer



Control unit- C.U complete instruction cycle.

Instruction Cycle-

- Fetch the instruction
- Decode the instruction

- Calculate the effective address
- Execute the Instruction

CU directs the operation of the processor

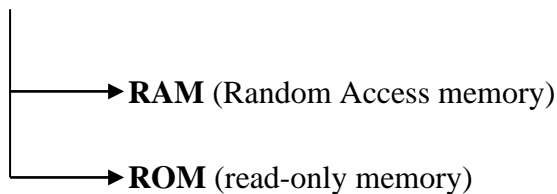
CU works by receiving input information that it converts into control signals.

Register- It is an electronic component that is used to hold the information as bits.

ALU- Arithmetic & logic unit is used to perform all Arithmetic operation and all logical operations. ALU is also called the core of the CPU.

Memory- It stores all the information entered through the input unit.

(1) Primary Memory/ Storage Memory



Primary memory used to store data but a memory required for processing, in intermediate & final results of processing.

It holds the result till the computer is on.

- it is a volatile type of memory, it is made up semiconductors devices the basic unit of memory is bit.

Ram – A flip flop mechanism available in the semiconductor

- It is **volatile memory**, which means when there is no power supplied to memory cell
- It will lose its bits stored in it.
- The data retrieved from the memory or to be stored in the memory one kept in a memory data register.
- Dynamic RAM uses an on-clip capacitor for each storage element.
- Static RAM uses a flip flop each memory element.

ROM- Use to store programs or data permanently it is known as non-volatile memory. Data will not be erased even after the power interruption.

(2) **Secondary memory-**

(i) **Floppy** – It is based an analogy signal that uses magnetic signals which are converted into mechanical signals, A floppy is not based on friction hence its durability is longer.

(ii) **CD-** It is an optical storage device that consists of a plastic disc on which a layer of aluminium is placed; the Al layer is highly polished.

In CD drive, there is high-intensity laser light that falls in red colour wavelength and this laser light creates a series of pits and plane surface that act as a digital system of 0 & 1. In CD drive another longer light is there that has a lower intensity & this light is reflected from plane surface & it is diverted by the pits, therefore plane surface are read as 1 and pits are read as 0, A digital code of 1 & 0 is created. That is converted into em signal & then into the mechanical signal.

(iii) DVD (Digital Versatile Disc)-

It uses laser light of a lower wavelength that can read more no. of pits. Therefore, its capacity is in 3 to 4 Gb.

(iv) Blue-Ray Disc – It uses a wavelength of laser light in blue colour & therefore it can read more no. of pits since the wavelength of blue is lower. As Wavelength reduces the frequency increases hence. It has better audio, video quality; its capacity is up to 8 Gb.

(v) Flash drive- The flash drive is of multiple types such as pen drive, solid-state drive, hard drive etc. The information is contained in the form of charged & uncharged particles & it makes a NAND gate along with USB drive.

In high capacity Pen drive or hard disc drive, there are layering of such charged & uncharged particle that gives the output.

Mobile – The mobile phone was started as FDMA & CDMA

(1) FDMA – (Frequency division multiple access) in these different frequencies are given to different users so that our overlapping of signals do not take place in FDMA. The signals overlap only where they are very closely spaced.

(2) CDMA- (code division multiple access)- In it multiple channels/users are connected in a single frequency called multiplexing, multiplexing, are of 4 types.

(a) Space division multiplexing- In space division, there are different networks to the same channels for transmission of lines, they are connected point to point. In this same frequency can be used in a different place.

(b) Frequency division multiplexing- different frequencies are used for different users.

(c) Time-division multiplexing- This is a division of time for the frequency and generally the frequency is given 3-time slots, frequency use increases by 3 times.

(d) Code division multiplexing- single frequency is divided into multiple users & these users are differentiated on the basis of different code given to them.

Generation of mobile phones.

0G - launched by bell laboratory but it was marketed by Motorola Company. It was based on analogy system and the calling was half-duplex i.e. either incoming or outgoing is possible at a time, SMS was not there.

1G – It was also launched by Motorola company but for this 1st-time duplex communication started but it was also based on analogy therefore SMS facility was not there

2G – This was the 1st digital mobile telephone launched by Nokia company of fin land, It was smaller in size since sim was not integrated & the sim or mobile or both could be changed. It had added feature of SMS, call waiting, call forwarding etc.

2G was based on circuit switching technology is many when a call is made from one telephone to another telephone this switches within a telephone exchange create a continuous wire connection b/w 2 telephone & it remained as continuum wire connection b/w2 telephone & it remained as continuous circuit till the call is made. This was completely different than GPRS

2.5G - It comes out with innovative technology of GPRS (**General packet radio service**) in which the data packets are divided into multiple packets & then transmitted through the network, it was faster than circuit switching since it was not necessary that data packet to flow the same channel so internet in 2.5G Become faster & also calls in 2.5G were better.

2.75G – It comes out with technology called **EDGE** technology (**enhanced data network for GSM Evolution**) EDGE tech. has idle time concept in it, i.e. If a person is idle on a network then the data will pass on to the neighbouring user on the same network. It reduces the cost of & also increases the data speed. Therefore, EDGE tech becomes very popular & it was the beginning of the internet revolution in India.

3G – It was the 1st brand band network in which higher band width was used. In 3G the internet speed was better but did not become cheaper. Therefore it did not gain popularity in rural areas therefore 3G did not become as successful as 2.75G.

4G - 4G was launched in India initially in GSM network by Airtel but it used costly & was not able to penetrate in an urban area only. It had only started then reliance jio launched 4G networks in CDMA with LTE technology.

- Actually 4G LTE is an enhanced 3G data network that centre into the criteria of 4G. It was launched by 3GPP.
- The EDGE, GSM & CDMA tech. All can be integrated, it is purely data network, for calling also LTE use, VOLTE (voice-over long term evaluates tech. In this voice converted to data & transmitted through internet signals, voice calling is almost zero.

- The LTE tech. is marketed as 4G LTE there are 2 types of LTE.

(1) **LTE – TDD- (long term evolution- time division duplex)** it is developed by a group of mobile phone companies such as Nokia, Samsung, etc. It is an innovative tech. of LTE; it uploads the data faster & therefore increases the speed.

(2) **LTE –FDD (long term evaluation- frequency division duplex)** It is based on pairing of the network, it means its range can increase by multiple times.

(3) **5G-** 5G is not yet launched but its expected speed is 1 GB/s to 10 Gb/s. therefore it will increase the digital convergence such as file medicine, tele education & teleconferencing in a single device i.e. Mobile.

Cyber world –

In 2000:- STUX NET started a cyber war. The cyber-world is digital; a world that runs parallel to the real world. For the 1st time, the cyber world was noticed in the year when STUXNET was launched Iranian Nuclear program, STUXNET was a cyber nuclear bomb that destroyed Iranian power grid system completely and also affected 50% of computer in the world this event laid to cyber war in the world & gave birth to malware.

Malware- Malwares is malicious software that gives negative result, some of the malware are

(1) **Virus - Vital information resources under seige)-** In day to day life virus also spreads on the computer through contact, it can come through e-mail or through visiting e-mail or through visiting a malicious website but the virus do not appear till the program is either download or clicked upon.

A virus can affect the software or important program, to protect the computer from virus, the antivirus is available, and antivirus are types-

Offline antivirus-which is network security features

Online antivirus -which is network security features

- Antivirus is only software.
- Effective antivirus is a combination of offline & online both.

(2) **Worms –** worms are a bad program that does not need contact to spread & it can appear in the computing system on its own.

It can spread in computing system & can affect hardware & software both, therefore they are more dangerous than a virus, to protect the computer from worms the affected programs are deleted or computer has to be formatted.

(3) **Trojans –** Trojans are good looking prog, but they turn out to be very bad when they are clicked upon. The Trojans are more dangerous than any other malware since it has no effective tool against it also Trojans are of a large number of types hence no specific tool can be designed for it.

They appear Inform of lottery, an antivirus important software, a heavy discounted products.

In 2015. A Trojan named as Beebon virus become popular & it appeared as removing Beebon virus from the computer but secretly downloaded the software. it affected Indian economy by 9000 crore rupees by hacking important information such as bank account number, pass words etc.

(4) spyware- It is a program that downloads in the computer automatically & starts sending important information to the host computer.

Spyware is used for stealing sensitive informative.

(5) Adware – these are computer adds that appears as a pop-up window & this window cannot be removed, the only way to remove it is by cold booting. Adware's are generally unharmed but the temporarily block the ongoing program.

(5) Ram som ware– these are the programs that encrypts important files or programs with a time of self-destructive. It demands ransom affected India & the world & demanded a ransom of files.

Other ransom ware also followed it but they did not become successful because of very high price rise in bit coin.

Cyber scam:-

(1) Phishing- it is a scam in which there are fake lottery fake heavy discounted products to gain sensitive information such as bank account no. & password etc.

(2) Visiting- These are the scam to spread communal violence through email social media website such as Face book or through Whats app. It disturbs a peaceful environment of the country.

Cyber security- There is generally 2 types of security.

(1) Network security

(2) System security

(1) Network Security- A network security is to secure malwares from the network, In network security, there are threads at multiple layers, therefore, the security are also in layers called as SSL (Security socket layer) where each layer works independently but also connected with each other in a socket.

The other type of network security is security from phishing, vishing & spoofing.

Spoofing- Spoofing is a type of scam where an intruder attempts to gain unauthorized access to user system or information by pretending to be the user.

To save from the spoofing regular change of password must be applied & to save from phishing. the vishing unwanted mails should be marked as spam.

(2) System security- there are offline antivirus & system security but the most important is a firewall.

Firewall – It is a network security & system security both as it is not allowed to malicious prog. to spread outside or outside malicious program to inter inside it is hardware, software or a combination of both. A firewall can protect particular affected program or the entire system as well.

A Firewall acts as barrier b/w a trusted and un-trusted network.

Bit coin – It is a crypto currency and it does not exist physically but it is a virtual currency based on the principle of a limited number of bit coins in the computing world (2^{128}).

- Its advantages are that it does not need to carry physically, no banks have to control over it and no govt. Can control bit coin neither it can be printed more nor it can be block marketed.
- In year 2010, a group of people started the idea of such digital currency in which there would be the distribution of this currency according to demand & supply & carry transaction in bit coin can be found by a mathematical operation.
- Bit coin is today going market in the world & few countries like japan have legalised it. In April 2017. The transactions are registered in block chain & value of bit coin is determined according to the demand and the available bit coins & every bit coin user become a member of block chain.

Disadvantages of bit coin:-

1. transactions and original ID of transactions cannot be found out, Anybody can transact bit coin using a fake address their four GOI on 1st April 2017 make bit coin as illegal currency because it believed that bit coins can be used for terrorisation activity & Illegal transactions.
2. The bit coin value is highly volatile and its value changes very rapidly therefore it is passable to use it for black marketing.
3. Bit coin has a very large value therefore it makes difficult to trade in smaller denominations, therefore, smaller denominations of bit coin was launched called as Satoshi but still it is not always convenient for very smaller values of coins.

There are other crypto currencies as well such as lit coin but bit coin is the only popular currency.

Superposition- means at the same space multiple switchers can function together.

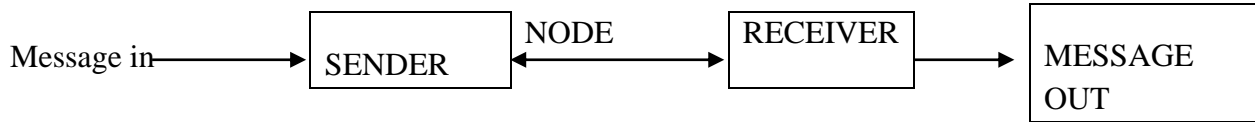
Entanglement – is the performance of a 2 different system producing the same result?

Quantum computing user super position & entanglement.



2-Networking

Network – A network is an interconnection of a series of ports or nodes connected together by communication both.



A network is a combination of two or more computer connected together for the purpose of exchange in information

The goal of networking-

1. Resource sharing
2. Provide high reliability
3. Saving money.
4. Increase system performance.

Various components of the network are-

- **Media** – provide a physical connection
- **Processors** – support the network connectivity
- **Modems** – modems stands of modulator demodulation.
- **Multiplexers** –use to combine data of multiple users to transmit over a common path.
- **Switch** – make connection b/w various nodes of a network.
- **Router-** it is an intelligent communication processor which makes connection b/w various nodes of the program with the help of protocols different rules.
- **Hub** – It is port switching communication processor which is used for automatic switching of various ports.
- **Getaways** – It is the communication process. Which connects the network? Which use different communication architecture? it is classified as.
 - (a) On the basis of the network topology.
 - (b) On the basis of network extent.

Based on the network topology-

The network topology is deferent as the physical interconnection of its constituent element. The interconnection may be real logical real interconnection refer to actual (physical) connection of a network. whereas logical interconnection refers to the way data is exchanged b/w the constituent element.

