SUMMER – 2019 EXAMINATION
MODEL ANSWER

Subject: Computer Hardware & Maintenance **Subject Code: 17533**

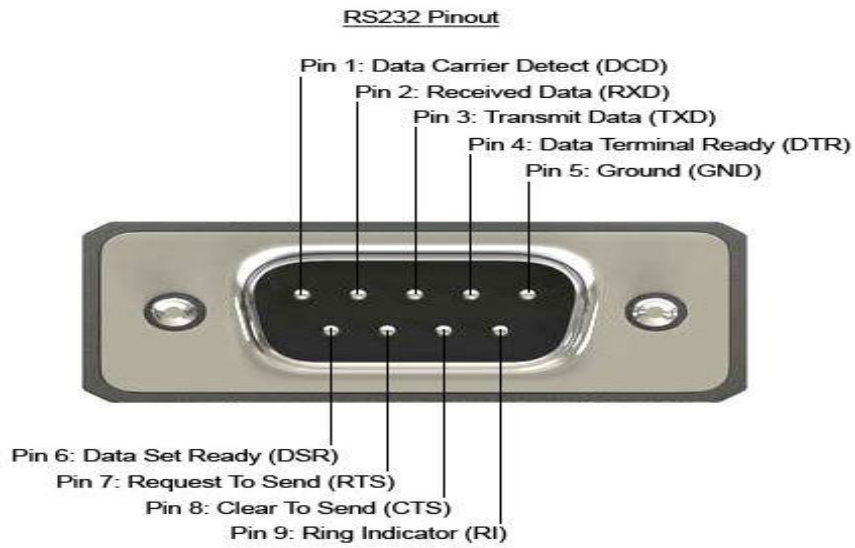
Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q.N.	Answer	Marking Scheme
1.	**a) (i)**	**Attempt any THREE of the following:** **Compare LAN, WAN and MAN on the basis of following point:** **1) Geographical area covered** **2) Communication Medium used** **3) Rate of data transmission** **4) Example / Application (any one)**	**12** **4M**
	Ans.		***1M for each point***

Comparison	**LAN**	**WAN**	**MAN**
Geographical area covered	Covers small geographical area.(up to 1km.)	Covers large locality and connects countries together. (Area above 100km)	Covers relatively large region such as cities, towns (Area within 1km to 100km).
Communication Medium used	Twisted pair cables and coaxial cables.	Telephone lines and radio waves, Optic	Modem and Wire/Cable

			Wi-Fi, Ethernet Cables.	wires, Microwaves, Satellites.		
		Rate of data transmission	High	Low	Moderate	
		Example / Application (any one)	Ethernet/ College, School, Hospital.	Internet/ Country, Continent.	Cable TV network / Small towns, City.	
	(ii) Ans.	**State any four functions of BIOS** The BIOS (Basic Input Output System) provides the processor with the information required to boot the system from a non-volatile storage unit (HDD, FDD, CD or other). It provides the system with the settings and resources that are available on the system. **Main functions of BIOS:** **1.** The main function of the BIOS is to give instructions for the power-on-self-test (POST). This self-test ensures that the computer has all of the necessary parts and functionality needed to successfully start itself, such as use of memory, a keyboard and other parts. **2**. If errors are detected during the test, the BIOS instruct the computer to give a code that reveals the problem. Error codes are typically a series of beeps heard shortly after startup. **3**. The BIOS also works to give the computer basic information about how to interact with some critical components such as drives and memory that it will need to load the operating system. **4.** Once the basic instructions have been loaded and the self-test has been passed, the computer can proceed with loading the operating system from one of the attached drives. **5.** Computer users can often make certain adjustments to the BIOS through a configuration screen on the computer. The setup screen is typically accessed with a special key sequence during the first moments of the startup. This setup screen often allows users to change the order in which drives are accessed during startup and control the functionality of a number of critical devices. Features vary among individual BIOS versions. **6.** Many PC manufacturers today use flash memory cards to hold BIOS information. This allows users to update the BIOS version on computers after a vendor releases an update. This system was designed to solve problems with the original BIOS or to add new	**4M** ***Any four functions 1M each***

		functionality. Users can periodically check for updated BIOS versions, as some vendors release a dozen or more updates over the course of a products lifetime. To check for updated BIOS, users can check the website of the specific hardware vendor.	
	(iii) Ans.	**Describe function of each pin of 9 pin RS 232 connector.**  An RS232 pinout 9 pin cable features nine pins: 1. Data Carrier Detect (DCD or CD) – After a data terminal is detected, a signal is sent to the data set that is going to be transmitted to the terminal. 2. Received Data – The data set receives the initial signal via the receive data line (RxD). 3. Transmitted Data (TxD) – The data terminal gets a signal from the data set, a confirmation that there is a connection between the data terminal and the data set. 4. Data Terminal Ready – A positive voltage is applied to the data terminal ready (DTR) line, a sign that the data terminal is prepared for the transmission of data. 5. Signal Ground – A return for all the signals on a single interface,	**4M** ***Diagram 1M*** ***Description of function 3M***

		the signal ground (SG) offers a return path for serial communications. Without SG, serial data cannot be transmitted between devices. 6. Data Set Ready – A positive voltage is applied to the data set ready (DSR) line, which ensures the serial communications between a data terminal and a data set can be completed. 7. Request to Send – A positive voltage indicates the request to send (RTS) can be performed, which means the data set is able to send information to the data terminal without interference. 8. Clear to Send – After a connection has been established between a data terminal and a distant modem, a clear to send (CTS) signal ensures the data terminal recognizes that communications can be performed. 9. Ring Indicator – The ring indicator (RI) signal will be activated if a modem that operates as a data set detects low frequency. When this occurs, the data terminal is alerted, but the RI will not stop the flow of serial data between devices.	
	(iv) Ans.	**List two problems and their causes related to display.** **1. Monitor dead:** • Monitor's fuse blown. • Monitor's power supply section faulty. • Fault in horizontal section **2. On Power-On system beeps but no display appears** • Setup information incorrect. • Display adapter not seated properly in expansion slot. **3. Power on LED glows but no raster** • Power supply voltage abnormal. • Some loose connection in power supply circuit. • Brightness control is in extreme OFF position. **4. Abnormal brightness in display** • Power supply voltage output high. • High screen voltage. **5. Corrupt display** • Software corrupts display adapter memory. • Display adapter memory (RAM) faulty.	**4M** ***Any two problems 2M each***

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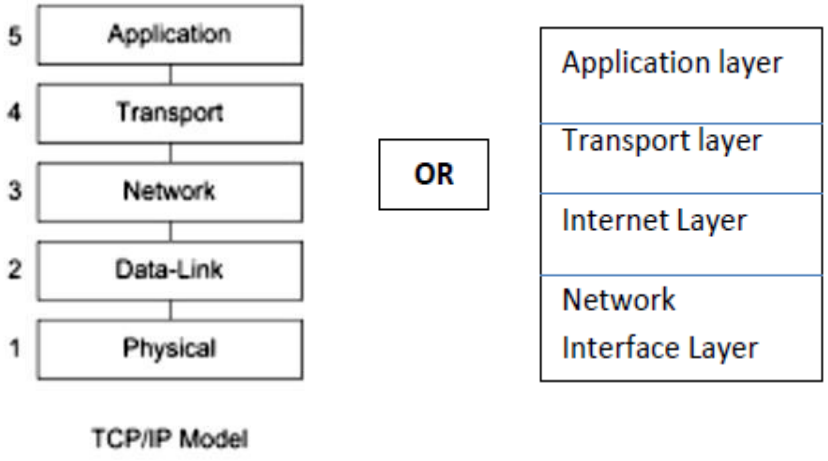
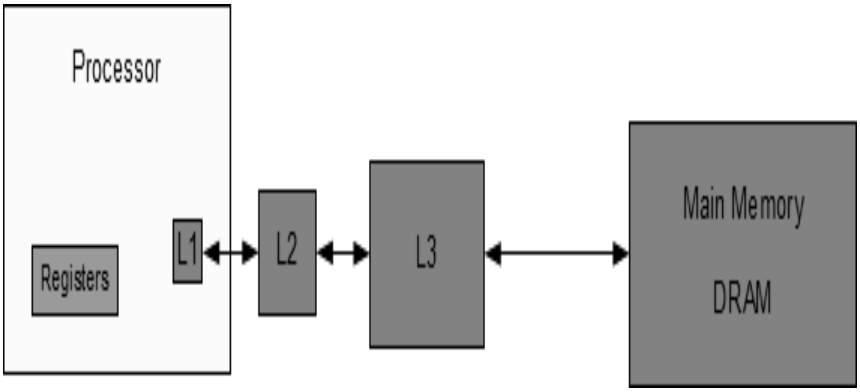
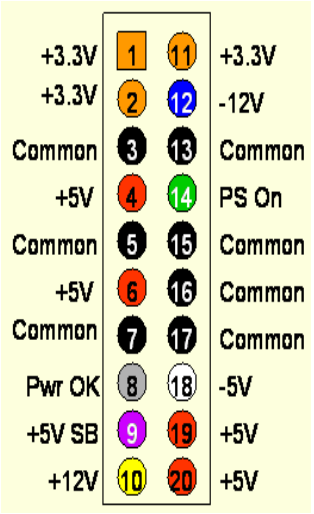
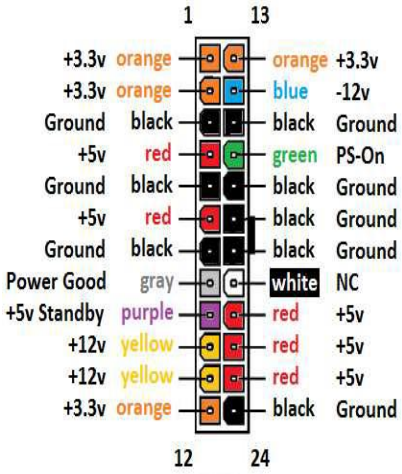
1.	**b)**	**Attempt any ONE of the following:**	**6**
	(i)	**Draw TCP-IP reference model and state the function of various layers.** ***(Note: Either 4 layer or 5 layer model may be considered)***	**6M**
	Ans.	**TCP/IP reference Model:**  **Fig: TCP/IP reference model with 5 layers and 4 layers** **Application Layer** Application layer is the top most layer of four layer TCP/IP model. Application layer is present on the top of the Transport layer. Application layer defines TCP/IP application protocols and how host programs interface with Transport layer services to use the network. Application layer includes all the higher-level protocols like DNS (Domain Naming System), HTTP(Hypertext Transfer Protocol), Telnet, SSH, FTP (File Transfer Protocol), TFTP (Trivial File Transfer Protocol), SNMP (Simple Network Management Protocol),SMTP (Simple Mail Transfer Protocol) , DHCP(Dynamic Host Configuration Protocol), X Windows, RDP (Remote Desktop Protocol) etc. **Transport Layer** Transport Layer is the third layer of the four layer TCP/IP model. The	***Diagram 2M*** ***Explanation (Any 2 functions from each layer) 4M***

		position of the Transport layer is between Application layer and Internet layer. The purpose of Transport layer is to permit devices on the source and destination hosts to carry on a conversation. Transport layer defines the level of service and status of the connection used when transporting data. The main protocols included at Transport layer are TCP (Transmission Control Protocol) and UDP (User Datagram Protocol). **Internet Layer** Internet Layer is the second layer of the four layer TCP/IP model. The position of Internet layer is between Network Access Layer and Transport layer. Internet layer pack data into data packets known as IP datagrams, which contain source and destination address (logical address or IP address) information that is used to forward the datagrams between hosts and across networks. The Internet layer is also responsible for routing of IP datagrams. Packet switching network depends upon a connectionless internetwork layer. This layer is known as Internet layer. Its job is to allow hosts to insert packets into any network and have them to deliver independently to the destination. At the destination side data packets may appear in a different order than they were sent. It is the job of the higher layers to rearrange them in order to deliver them to proper network applications operating at the Application layer. The main protocols included at Internet layer are IP (Internet Protocol), ICMP (Internet Control Message Protocol), ARP (Address Resolution Protocol), RARP (Reverse Address Resolution Protocol) and IGMP (Internet Group Management Protocol). **Network Access Layer (Host to network Layer)** Network Access Layer is the first layer of the four layer TCP/IP model. Network Access Layer defines details of how data is physically sent through the network, including how bits are electrically or optically signaled by hardware devices that interface directly with a network medium, such as coaxial cable, optical fiber,	

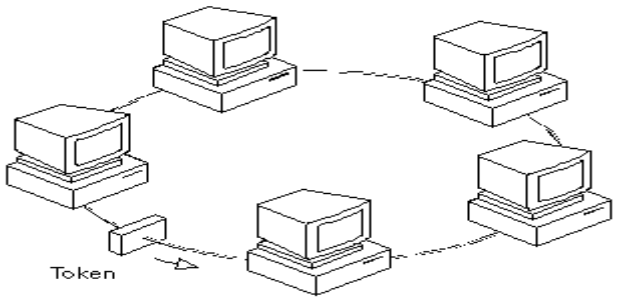
		or twisted pair copper wire. The protocols included in Network Access Layer are Ethernet, Token Ring, FDDI, X.25, Frame Relay etc.	
	(ii) **Ans.**	**State cache memory? Give its types and explain with neat diagram.** **Cache memory:**  Cache memory is extremely fast memory that is built into a CPU, or located next to it on a separate chip. It supplies the processor with the most frequently requested data and instructions. A cache controller always tries to make sure that the data required by the processor in the next memory access is available in the cache memory. There are three types of cache memory: **L1, L2 & L3 cache memory.** **L1 cache memory:** The L1 cache also called internal or integral cache is always a part of the processor chip. L1 cache always runs at full processor speed. It was the fastest cache in the system. L1 cache was originally 8 KB. **L2 cache memory:** The L2 cache originally called external cache because it was external to the processor chip when it was introduced. It was present on the motherboard and used to run at CPU bus speed. To improve the performance of the system, L2 cache was directly	**6M** ***Diagram 2M*** ***Cache memory descripti on 1M*** ***Types 3M***

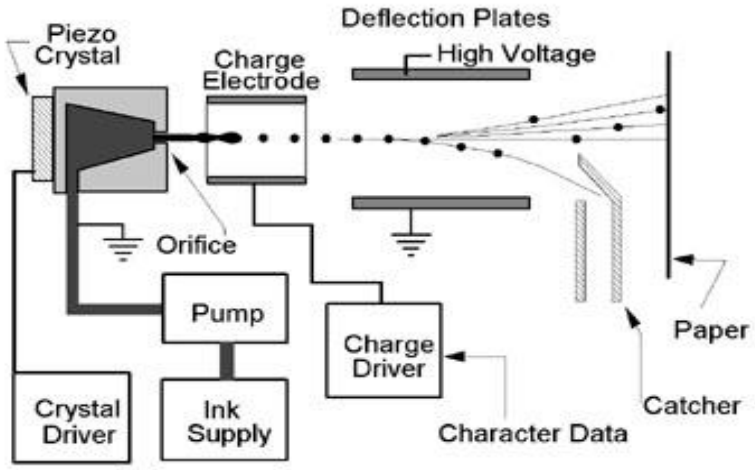
		incorporated as part of the processor die. L2 cache was originally 128 KB. **L3 cache memory:** The L3 cache has been present in high end work stations and servers such as Xenon and Itanium. Pentium 4 Extreme Edition was the first desktop PC processor with L3 cache. Later Editions of same processor were introduced with larger L2 cache rather than L3 cache.	
2.	**a)** **Ans.**	**Attempt any <u>FOUR</u> of the following:** **Draw pin diagram of ATX power supply. Give specifications of each pin.**  20 pin connector **OR**  24 pin connector The diagram shows the pin specification. +5v,+3.3v,+12v and -12v are used for supplying voltages to various peripheral devices. Following pins have special functions: 1. **PS_ON or Power on**: This has a green wire which is a signal from the motherboard to the power supply. When the line is connected to ground (by the motherboard), the power supply turns on. It is internally pulled up to +5 V inside the power supply. 2. **PWR_OK or Power good**: is an output from the power supply that indicates that its output has stabilized and is ready for use. It remains low for a brief time (100–500 ms) after the PS_ON signal	**16** **4M** ***Diagram 2M*** ***Specification 2M***

		is pulled low. 3. **+5 VSB or +5 V standby** : Supplies power even when the rest of the supply lines are off. 4. **+3.3 V sense** : This should be connected to the +3.3 V on the motherboard or its power connector. This connection allows for remote sensing of the voltage drop in the power supply wiring.	
	b) Ans.	**Describe any four preventive maintenance for hard disk.** **Preventive maintenance of Hard Disk** • Take periodic backup of data and critical areas such as boot sectors, FAT and directory structure on the disk. • Defragment the disk to maintain the disk efficiency and speed. • Delete all the temporary files, temporary internet files etc. • Take backup and format the HDD at least once a year. • Reinstall all the software to maintain disk efficiency and speed.	**4M** ***Any four preventive 1M each***
	c) Ans.	**List networking devices. State function of any two devices.** **Following are the various networking devices:** • Hubs • Switches • Routers • Bridges • Repeaters • Gateways • Modems **Hubs:** A hub is a small, simple, inexpensive device that joins multiple computers together at a low level network protocol layer. ***Functions*** It is essentially a multi port repeater (repeater receives digital data, regenerates the signal and then re-transmits the data) **Switches:** A switch is a networking device that joins multiple computers together at a low level network protocol layer. ***Functions*** It is used to transport the data to the specific computer.	**4M** ***Listing 2M***

		Routers: A router is a physical device that joins multiple networks together. ***Functions*** It connects dissimilar networks such as LAN and Internet together. **Bridges:** A bridge is an electrical device which connects and passes packets between two network segments. ***Functions*** It is used to send the data to the concerned segment, thus reducing excess traffic. **Repeaters:** A repeater is an electronic device that simply regenerates a signal. ***Functions*** It recreates the bit pattern of the signal and puts this regenerated signal back to the transmission medium. **Gateways:** Gateway is a device used to connect networks using different protocols. ***Functions*** A gateway repackages information to match the requirements of the destination system. **Modems:** Modem is a device that makes it possible for computers to communicate over a telephone line. The word MODEM Stands for "MOdulator-DEModulator. ***Functions*** It is used to connect telephone lines (which uses analog signals) to computers (which uses digital signals) for data communication.	***Functions of any two devices 1M each***
	d) Ans.	**Write any four feature of ISA and PCI Express.** **Features of ISA:** 1. The 8-bit ISA bus consists of a single card edge connector with 62 contacts. 2. The bus provides 8 data lines & 20 bit address lines. 3. The bus also supports connections for six interrupts and three DMA channels.	**4M** ***Any four features of ISA $^{1/2}$M each***

		4. It runs at a speed of 4.77 MHz & has a transfer speed of 8MBps which makes it faster than serial ports, parallel ports, floppy controllers, keyboard controllers. 5. ISA supports 1 MB of memory. **Features of PCI Express:** 1. PCI Express uses high speed serial signaling. 2. It is a switched design for point-to-point communication between devices. 3. It uses a packet-based system to exchange both data and commands. 4. PCI Express uses a four-wire interconnection system, two wires each (a balanced pair) for separate sending and receiving channels. 5. PCI Express allows multiple lanes within a single channel.	***Any four features of PCI 1/2M each***
	e) Ans.	**Explain four functions of transport layer in OSI model.** **The functions of Transport layer are:** 1. The transport layer provides the functional and procedural means of transferring variable-length data sequences from a source to a destination host via one or more networks, while maintaining the quality of service functions. 2. The basic function of the transport layer is to accept the data from the session layer, split it up into smaller units, pass these to the network layer, and ensure that the pieces all arrive correctly at the other end. 3. This is done efficiently in a way that isolates the upper layers from the inevitable changes in the hardware technology. 4. The transport layer creates a distinct network connection for each transport connection required by the session layer. 5. The transport layer create multiple network connections, dividing the data among the network connections to improve throughput.	**4M** ***Any four function s 1M each***
3.	**a) Ans.**	**Attempt any <u>TWO</u> of the following:** **What is network topology? List network standards. Explain token ring standard with the help of diagram.** **Network topology:** A network topology is the arrangement of a network, including its nodes and connecting lines. There are two ways of defining network geometry: the physical topology and the logical (or signal) topology. 1. The physical topology of a network is the actual geometric layout of workstations 2. Logical (or signal) topology refers to the nature of the paths the signals follow from node to node. In many instances, the logical	**16** **8M** ***Network topology 2M***

		topology is the same as the physical topology, but this is not always the case. For example, some networks are physically laid out in a star configuration, but they operate logically as bus or ring networks **Network Standards:** The different network standards are: 1. Ethernet (IEEE 802.3) 2. Token ring (IEEE 802.5) 3. Wireless LAN (IEEE 802.11) 4. FDDI **Token Ring:** A Token Ring network is a local area network (LAN) in which all computers are connected in a ring or star topology and a bit- or token-passing scheme is used in order to prevent the collision of data between two computers that want to send messages at the same time. The Token Ring protocol is the second most widely-used protocol on local area networks after Ethernet. Token ring local area network (LAN) technology is a protocol which resides at the data link layer (DLL) of the OSI model. It used a special three-byte frame called a token that travels around the ring. Token-possession grants the possessor permission to transmit on the medium. Token ring frames travel completely around the loop.  The data transmission process goes as follows: • Empty information frames are continuously circulated on the ring. • When a computer has a message to send, it seizes the token. The computer will then be able to send the frame. • The frame is then examined by each successive workstation. The workstation that identifies itself to be the destination for the message copies it from the frame and changes the token back to 0.	***Network standards (Any 2) 2M*** ***Token ring Diagram - 2M; Explanation- 2M***

		• When the frame gets back to the originator, it sees that the token has been changed to 0 and that the message has been copied and received. It removes the message from the frame. • The frame continues to circulate as an "empty" frame, ready to be taken by a workstation when it has a message to send.	
	b) **Ans.**	**Draw neat labelled constructional diagram of INKJET printer. Describe the function of each block. State two advantages.** It is a non-impact printer. It provides letter quality printout than dot matrix printer. Its output is sharper than Dot matrix though its output quality is not to the same level of laser printer & it is cost is less than Laser printer. In inkjet printer, ink is emitted from nozzles as they pass over the media. A print head scans the page in horizontal strips, using a motor assembly rolls the paper in vertical steps. A strip of image is printed, then the page moves on, ready for the next strip. To speed up things the print head doesn't print just a single row of pixel in each pass but a vertical row of pixels at a time.  **OR**	**8M** ***Explanation 3M*** ***Diagram 3M***

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		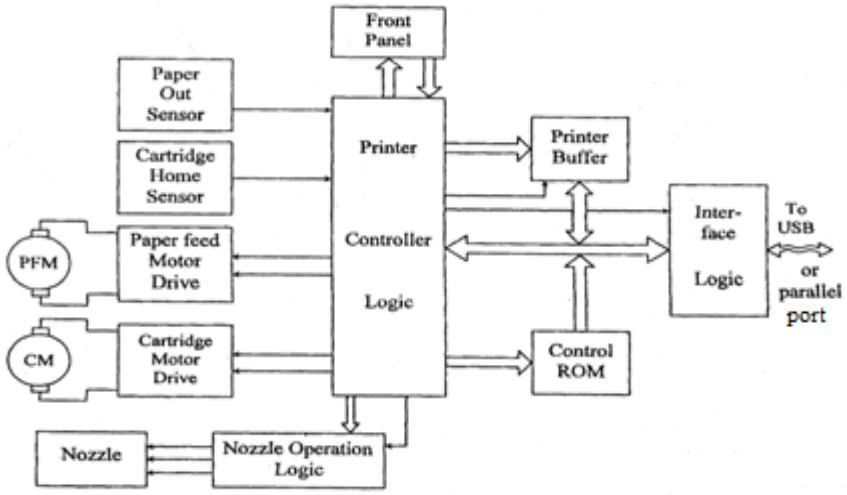 **Principle:** Conductive ink is forced through a very small nozzle to produce a high-speed stream or jet of drops of inks. The size and spacing of these drops are made constant by vibrating, the nozzle compartment at an ultrasonic frequency with a piezo crystal mounted at one end of the cavity. The vibrating frequency is around 100 KHz; the drop diameter is 0.06mm and the spacing 0.15mm. Each drop of ink after leaving the cavity is given a specific amount of electrical charge as it passes through a charging electrode structure, which is located at the point at which the stream breaks up into drops. The drops are deflected vertically by a second electrode structure and strike the printing structure. The amount of deflection is determined by the charge originally imparted to the drop. With no charge imparted there is no deflection. **Advantages:** • They are silent in operation when compared to impact printers. • It produces an output, which is compatible in quality to that of a laser printer. • Faster when compared to Dot Matrix printers.	***Any two advantages 1M each***
	c)	**Explain following term:** **(i) Subnet Masking** **(ii) ARP** **(iii) FTP** **(iv) TCP**	**8M**

	Ans.	**(i) Subnet masking:** Subnet mask is a 32 bits long address divided into 4 octets used to distinguish between network address and host address in IP address. It is always used with IP address. • It is used to identify which part of an IP address is network address and which part is host address. • Wherever there is '0' in the subnet mask, the corresponding bit in the IP address represents host bit and wherever there is '1', the corresponding bit in the IP address represents network bit. • The default subnet mask for class A is 255.0.0.0, class B is 255.255.0.0 and class C is 255.255.255.0. • Thus for a class A IP address, by default, the first octet represents the network ID and the remaining numbers represent host ID. **(ii) ARP:** **Address Resolution Protocol** used to convert IP address into corresponding physical or MAC address. **Functions:** • ARP takes the IP address of a host as input & gives its corresponding physical address as the output. • It sends the broadcast message to all the computers on the network for the given IP address. • The computer whose IP address matches the broadcast IP address sends a reply and along with its physical address to the broadcasting computer. • All other computers ignore the broadcast message as IP address is different. • As it knows sender hardware as well as IP address, it unicasts the reply so that only sender receives it. **(iii) FTP:** **File Transfer Protocol** used to transfer files over internet. **Functions:** • FTP is a stranded mechanism provided by the Internet for copying a file from one host to the other. • FTP establishes two connections between the client and server. One is for data transfer and the other is for the control information. • The fact that FTP separates control and data makes it very efficient. • The control connection uses simple rules of communication. Only	***Each term explanation 2M***

		one line of command or a line of response is transferred at a time. • But the data connection uses more complex rules due to the variety of data types being transferred. • FTP uses port 21 for the control connection and port 20 for the data connection. **(iv) TCP :** **Transmission Control Protocol** used to establish the connection between two computers in a network. • TCP is a full duplex, connection oriented, reliable and accurate protocol. • When two TCPs in two machines are connected, they are able to send data using segments to each other simultaneously. • Transmission Control Protocol (TCP) is one of the transport layer protocols in the TCP/IP protocol suite. • The unit of data transfer between two devices using TCP software is called a segment; it has 20 to 60 bytes of header, followed by data from the application program. • A TCP connection normally consists of three phases: connection establishment, data transfer, and connection termination. The connection establishment in TCP is called three way handshaking. • TCP uses flow control, implemented as a sliding window mechanism, to avoid bulk data at the receiver. • TCP uses error control to provide a reliable service. Corrupt and lost segments are retransmitted, and duplicate segments are discarded.	