

Computer Hardware & Networking

Time: 2 Hrs.]

Prelim Question Paper Solution

[Marks : 50

Q.1 (a) Attempt any THREE of following :

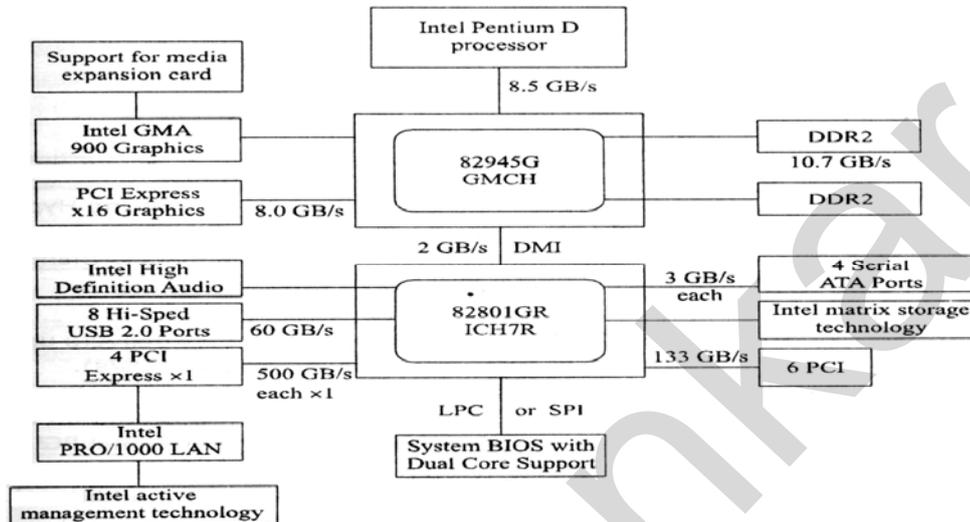
[12]

Q.1 (a) (i) Explain the architecture of Intel chipset 945G with diagram.

[4]

(A) Architecture of Intel chipset 945G

[2 marks]



[Any Four - 2 marks]

- The Intel 945 G chipset family includes 3 members 945G, 945P and 945TL.
- It supports Intel new dual core Pentium. Processor and also supports Pentium 4HT technology processor.
- It offers FSB speed up to 1066 MHz.
- 4GB dual channel DDR2 memory.
- It also incorporates Intel graphic media accelerator integrated on board.
- It used ICH7 which is faster than ICH6.

Q.1 (a) (ii) Describe the importance of preventive maintenance.

[4]

(A) Importance of Preventive Maintenance

[Explanation - 4 marks]

Preventive maintenance is one of the most ignored aspects of PC ownership, most people seem to think that the PC doesn't need preventive maintenance, and so you should just use it until it breaks, and then repair or replace it. Some reasons why there should be a preventive maintenance plan for PC :

- **Preventive Maintenance Saves Money**
 Avoiding problems with your PC will save you money in the long run, compared with laying out cash for new components or repair jobs.
- **Preventive Maintenance Saves Time**
 Because it saves you the much bigger hassles of dealing with system failures and data loss. Most preventive maintenance procedures are quite simple compared to troubleshooting and repair procedures.
- **Preventive Maintenance Helps Safeguard Your Data**
 The data on the hard disk is more important than the hardware that houses it. Taking steps to protect this data therefore makes sense, and that is what preventive maintenance is all about.
- **Preventive Maintenance Improves Performance**
 Some parts of system will actually degrade in performance over time, and preventive maintenance will help to improve the speed of your system in these respects.

Q.1 (a) (iii) Differentiate between CRT and LCD display.

[4]

(A)

[Any four points - 1 mark each]

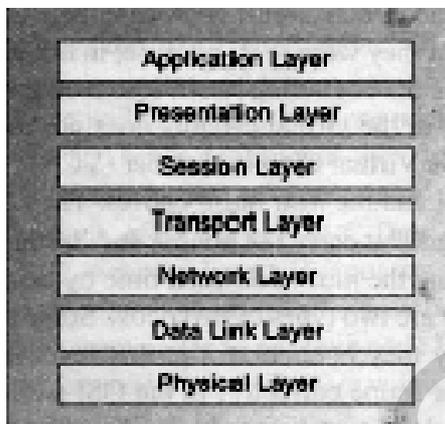
	CRT	LCD
(i)	CRT monitors require about 100 W for 19" display.	LCD monitors require 45 W for 19" display.
(ii)	CRT's are heavier than LCD.	LCD monitors are lighter and thinner.
(iii)	They are mounted on table.	They can be mounted on the wall.
(iv)	With CRT tilt up-down, swivel, orientation from horizontal to vertical mode is not possible.	With LCD's tilt up-down, swivel, orientation from horizontal to vertical mode is possible.
(v)	CRT displays text is not good as LCD.	LCD displays text better than CRTs.

Q.1 (a) (iv) Draw OSI reference model. State function of any two layer.

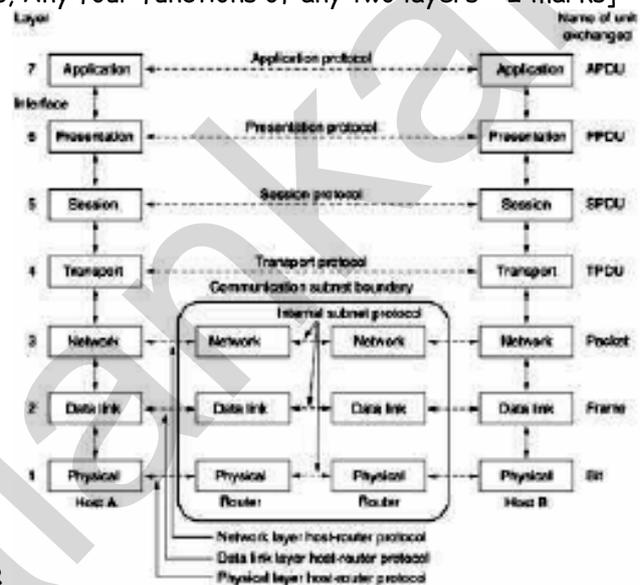
[4]

(A)

[Diagram - 2 marks, Any four functions of any two layers - 2 marks]



OR



OSI model (Open System Interconnection) model was developed by ISO (International Standard Organization)

Function of OSI model:

- (i) It provides way to understand how internetwork operates.
- (ii) It gives guideline for creating network standard.

OSI model has 7 layers as shown in the above figure.

- Application Layer
- Presentation Layer
- Session Layer
- Transport Layer
- Network Layer
- Data link Layer
- Physical Layer

1. Physical layer

It co-ordinates the functions required to transmit bit stream over physical medium. It deals with mechanical and electrical specifications of interface and transmission medium. For transmission it defines procedures and functions that devices and transmission medium has to perform.

- Physical characteristics of interfaces and media.
- Representation of bits: Data rate (transmission rate).
- Synchronization of bits.
- Line configuration: Point to point or multipoint configuration should be used.

2. Data link layer

It is responsible for transmitting group of bits between the adjacent nodes. The group of bits is called as frame. The network layer passes a data unit to the data link layer. Header and trailer is added to the data unit by data link layer. This data unit is passed to the physical layer. Data link layer is responsible for moving frames from one node to the next.

Functions of data link layer are:

- Framing
- Physical addressing
- Flow control
- Error control
- Media access control
- Node to node delivery

3. Network layer

It is responsible for routing the packets within the subnet i.e. from source to destination. It is responsible for source to destination delivery of individual packets across multiple networks. It ensures that packet is delivered from point of origin to destination.

Functions of network layer:

- Logical addressing
- Routing
- Congestion control
- Accounting and billing
- Address transformation
- Source host to destination host error free delivery of packet

4. Transport layer

Responsibility of process to process delivery of message Ensure that whole message arrives in order.

Functions of Transport layer:

- Service point addressing
- Segmentation and reassembly
- Connection control
- Flow control: Flow control is performed end to end
- Error control

5. Session layer

Establishes, maintains, and synchronizes the interaction among communication systems It is responsible for dialog control and synchronization.

Functions of Session layer:

- Dialog control
- Synchronization, session and sub session
- Session closure

6. Presentation layer

It is concerned with syntax, semantics of information exchanged between the two systems.

Functions of Presentation layer:

- Translation: presentation layer is responsible for converting various formats into required format of the recipient.
- Encryption: Data encryption and decryption is done by presentation layer for security.
- Compression and Decompression: data to be transform compressed while sending and decompress while receiving for reducing time of transmission.

7. Application layer

It enables user to access the network. It provides user interfaces and support for services like email, remote file access.

Functions of Application layer:

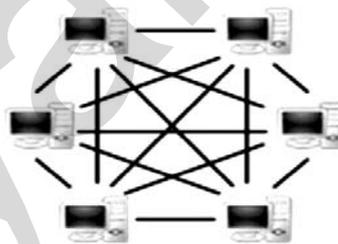
- Network virtual terminal
- File transfer access and management
- Mail services and directory services

Q.1 (b) Attempt any ONE of following : [6]

Q.1 (b) (i) Describe peer to peer and client server networks. [6]

(A) Peer to Peer network [2 marks]

- Peer to peer (P2P) is an alternative network model to that provided by traditional client-server architecture.
- P2P networks use a decentralized model in which each machine, referred to as a peer, functions as a client with its own layer of server functionality.
- A peer plays the role of a client and a server at the same time.
- That is, the peer can initiate requests to other peers, and at the same time respond to incoming requests from other peers on the network.
- It differs from the traditional client-server model where a client can only send requests to a server and then wait for the server's response.
- In P2P networks overall network performance actually improves as an increasing number of peers are added to the network.
- These peers can organize themselves into ad-hoc groups as they communicate, collaborate and share bandwidth with each other to complete the tasks at hand (e.g. file sharing).
- Each peer can upload and download at the same time, and in a process like this, new peers can join the group while old peers leave at any time.
- This dynamic re-organization of group peer members is transparent to end-users.



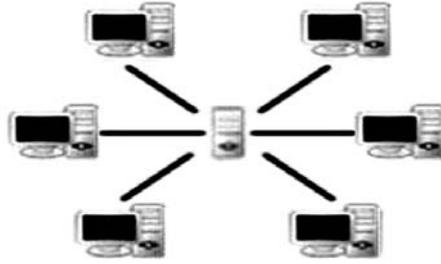
[1 mark]

A peer to peer based network

Client Server Network [2 marks]

- There are an almost infinite variety of client/server networks, but all of them have a couple of things in common.
- All have centralized security databases that control access to shared resources on servers.
- A client can only send requests to a server and then wait for the server's response.
- The server contains a list of usernames and passwords. Users can't log on to the network unless they supply valid usernames and passwords to the server.
- Once logged on, users may access only those resources that the network administrator allows them to access.
- Thus, client/server networks possess much more security than do peer-to-peer networks.

Client/server networks also tend to be much more stable.



[1 mark]

A server based network

Q.1 (b) (ii) Compare between OSI and TCP/IP model. [6]

(A)

[Any 6 points - 1 mark each]

	TCP/IP	OSI
1)	It has four layers.	It has 7 layers.
2)	It is predated to OSI (1970).	It is postdate to TCP/IP (1983).
3)	Session layer & presentation layers are absent.	Session & presentation layers are present.
4)	Protocol came first it model describe the existing protocol .	Models were divided first. Doesn't state the protocols to be use.
5)	Particularly use in maximum networks.	Not particularly use to compare other model.
6)	Can't be used to compose every model.	Can be used to compose other model.
7)	Network/Internet layer is connection less.	N/W layer is both connection oriented and connectionless.
8)	Transport layer is both connection less and connection oriented.	Transport layer is connection oriented.

Q.2 Attempt any FOUR of the following : [16]

Q.2 (a) Explain BIOS with any three functions. [4]

(A)

BIOS

[1 mark]

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 :

[3 marks]

- (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 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.

Q.2 (b) What do you mean by POST? Give the solution for the following error indication. [4]

- (i) **No beep** (ii) **Continuous beep.**

(A) The PC has built - in test programs which do their jobs as soon as the PC is powered on. This Power On Self Test (POST) firmware is stored in ROM on the motherboard. This ROM occupies the place (address) from where the microprocessor starts instruction processing, after a power on reset or hardware manual reset. [2 marks]

(i) **No beep:** Checking of power supply system board, or disconnected speaker. [1 mark]

(ii) **Continuous beep:** Checking of power supply system board, key board. [1 mark]

Q.2 (c) Write preventive maintenance procedure of [4]

- (i) **keyboard** (ii) **Hard-disk**

(A) [Any four maintenance procedure of Keyboard & Hard Disk – 2 marks each]

Preventive maintenance procedure of Keyboard:

- Handle the keyboard gently and carefully.
- Press the keys gently without applying force and do not rest hands on the keyboards.
- Do not spill liquid on the keyboard.
- Do not play with the keyboard after powering off the system.
- Make sure that the keyboard cable is not subjected to high stress at the keyboard end. This will lead to break in signal wire inside keyboard cable.
- Periodically clean interior the keyboard with a miniature vacuum cleaner or turn it upside down to blow out the accumulated dirt.
- For cleaning conducting parts of keyboard, use denatured alcohol along with lint free material.
- Use special dust protection cover for covering the keyboard when not in use.

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 and reinstall all the software to maintain disk efficiency and speed.

Q.2 (d) Define IP Addressing. List IP Address classes with their range. [4]

(A) [Definition - 2 marks, Classes with range - 2 marks]

IP address:

It is a unique logical address specified in the TCP/IP used to identify the host in a computer network. It can be a 32 bit address (IPv4) or a 128 bit address (IPv6). The IPv4 address include two parts namely, Network Identification number (net id) and Host identification number (host id). There are five different classes or formats of IP address are as given below:

Class A:

Class A type of IP addresses have First byte consisting of Network address with first bit as 0 and the next 3 bytes with host id. Hence, numbers of hosts are more when compared to number of networks.

Class B:

This type has first two bytes specifying network ID with starting two bits as 10 and last two bytes referring to host ID.

Class C:

This class has first three bytes referring to network with starting bits as 110 and last byte signifies Host ID. Here, numbers of networks are more when compared to number of hosts in each network.

Class D:

Class D is used for multicasting and its starting bits are 1110.

Class E:

Class E is reserved for future use and its starting bits are 1111.

Class	1 st Octet (Decimal)	1 st Octet High Order Bits				Network / Host ID
A	1 – 126 *	0				N . H . H . H
B	128 – 191	1	0			N . N . H . H
C	192 – 223	1	1	0		N . N . N . H
D	224 – 239	1	1	1	0	Reserved for Multicasting
E	240 - 254	1	1	1	0	Experimental ; used for research

Q.2 (e) Name the different TCP/IP protocols. Explain the working of FTP. [4]

(A) [Any four TCP/IP Protocols - 1 mark, Diagram - 1 mark, FTP working - 2 marks]

TCP/IP Protocols:

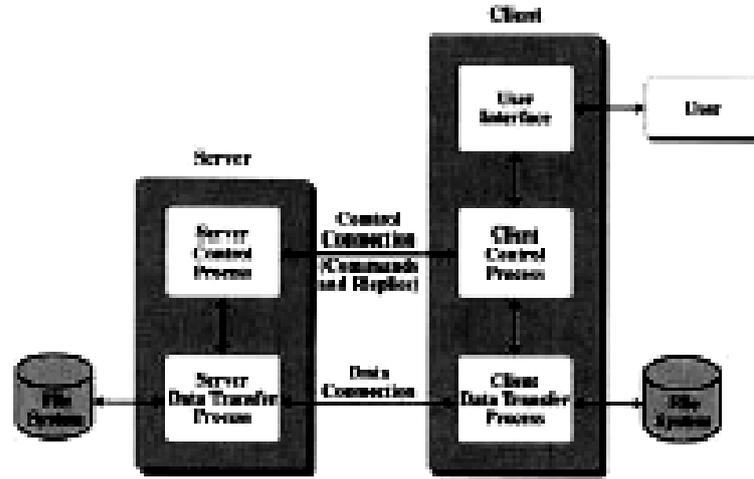
1. DNS (Domain Naming System)
2. HTTP (Hypertext Transfer Protocol)
3. Telnet
4. FTP (File Transfer Protocol)
5. TFTP (Trivial File Transfer Protocol)
6. SNMP (Simple Network Management Protocol)
7. SMTP (Simple Mail Transfer Protocol)
8. DHCP (Dynamic Host Configuration Protocol)
9. TCP (Transmission Control Protocol)
10. UDP (User Datagram Protocol)
11. IP (Internet Protocol)
12. ICMP (Internet Control Message Protocol)
13. ARP (Address Resolution Protocol)
14. RARP (Reverse Address Resolution Protocol)
15. IGMP (Internet Group Management Protocol)
16. Ethernet, Token Ring, FDDI, X.25, Frame Relay

FTP working

FTP (File Transfer Protocol) is a high-level (application layer) protocol is an interface for any user of the internet to transfer files. The user requests the FTP to either retrieve from or upload a file to a remote server.

FTP presents the user with a prompt and allows entering of various commands for accessing and downloading files that are physically exist on a remote computer. After invoking an FTP application, the user identifies a remote computer and instructs FTP to establish a connection with it. FTP contacts the remote computer using TCP/IP software. Once the connection is established, the user can choose to download a file from the remote computer, or an send file to be stored on the remote computer.

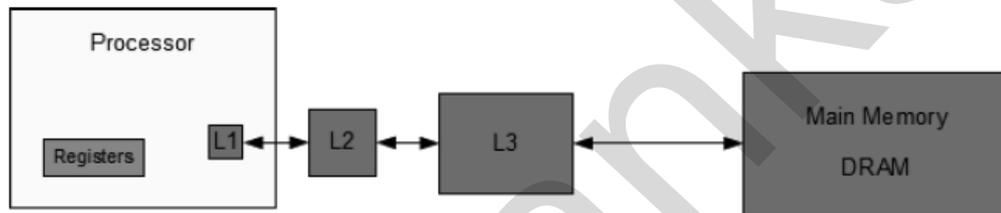
FTP uses two connections between a client and a server. One connection is used for the actual file's data transfer and the other is used for control information (commands and responses). FTP uses two well-known TCP ports: port 21 is used for the control connection and port 20 is used for the data connection.



Q.3 Attempt any TWO of the following : [16]

Q.3 (a) What is cache memory? What are it's types? With the help of neat diagram [8] explain the working principle of cache.

(A) [Explanation - 2 marks, Types - 2 marks, Diagram - 2 marks, Working - 2 marks]



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.

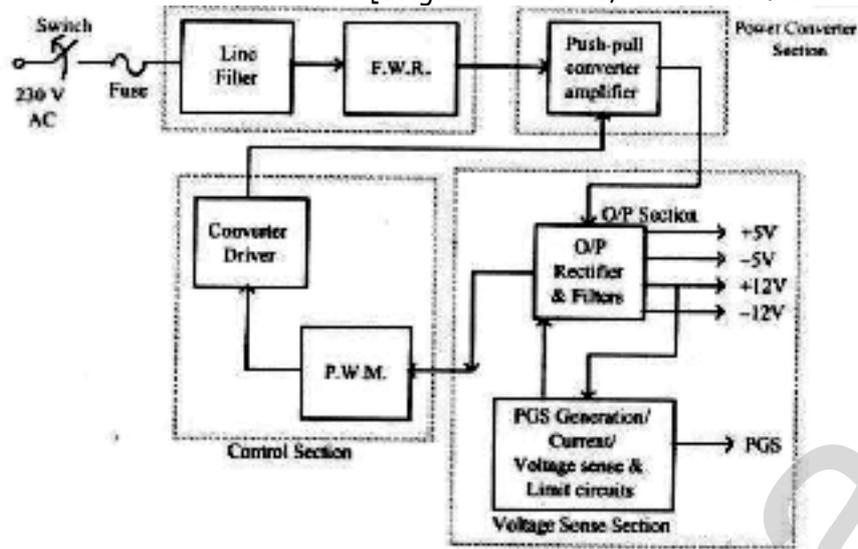
L2 cache memory:

- 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 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.

Q.3 (b) Draw the block diagram of SMPS and state the function of each block. [8]
 (A) [Diagram - 4 marks, Functions of each block - 4 marks]



SMPS used in a PC has five sections

AC input section

Receives unregulated input AC supply from mains. This signal is filtered using line filter and given to full wave rectifier for rectification. The fuse protects the SMPS from over current draining.

Power converter

It consists of push pull configuration of transistors which are driven by converter driver from the control section. Only desired quantity of power is delivered to the load.

Control section

It senses over voltage or over current at load.

It changes the turn on time of the transistors in the push pull amplifier so that output power can be controlled.

It applies Pulse Width Modulated Waveforms to converter driver circuit at 22 KHz frequency.

Output section

It rectifies and filters the power received from the power section.

It provides short circuit and overload protection to the power applied to the load.

Voltage sense section

It generates Power Good Signal (PGS). When all four voltage outputs (+5V, -5V, +12V, -12V) are steady above minimum sense levels for more than 100ms, PGS is generated by this section. It checks the maximum load current and compares it with specified current. If the connected load exceeds the specified load, current limit circuits shut off the output section of the SMPS, thereby avoiding damage due to over current flow.

Q.3 (c) List the networking devices. State the function of any four devices. [8]
 (A) [Listing - 2 marks, Functions of any four devices - 6 marks]

Following are the various networking devices:

- Hubs
- Switches
- Router
- Bridge
- 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.
- **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.

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