



**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION**

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**SUMMER – 2016 EXAMINATION**

**Subject Code: 17533**

**Model Answer**

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**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.1 A Attempt any three:**

**12M**

**a) List four features of ISA and PCI Express.**

*(Any four features of ISA 2 Marks, any four features of PCI Express 2 Marks)*

**Note: Any other relevant feature shall be considered.**

**Ans:**

**ISA**

1. Eight data lines.
2. Eight interrupt request levels.
3. 20 address lines.
4. Enables to handle 1MB of memory.
5. Supports 3-4 DMA (Direct Memory Access) channels.

**PCI Express**

1. Peripheral Component Inter connect (PCI) has 32 bit wide data.
2. It runs on 2.5GHz.
3. No priority queues.
4. Address / Data lines multiplexed.
5. Multi target, multi master
6. The maximum transfer rate is 16Gbps.



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**b) Write preventive maintenance procedure of laser printer.**

*(Any 8 points 1/2 Mark each)*

**Ans:**

Since printer is partly mechanical, it requires more maintenance.

1. Clean the exterior of printer using soft cloth with mild organic solvent.
2. Do not place printer near heat generating machines such as heater and furnaces.
3. Periodically, clean out dust, paper fragments and dirt from its mechanism using soft brush.
4. Check that the paper feed path is free of obstruction and clean paper feed path, platen and ribbon path with soft cloth
5. Check and clean the print head and ink cartridge.
6. Denatured alcohol can be used for cleaning the inner parts such as stepper motor, printer head etc.
7. Test for the satisfactory print quality.
8. The mechanics of different printers vary with their types. So consult their manual for their PM.

**c) Differentiate between CRT and LCD Display (four points) .**

*(Any four points 1 Mark each)*

**Ans:**

<b>Sr. No</b>	<b>CRT</b>	<b>LCD</b>
1	CRT monitors require about 100 W for 19" display.	LCD monitors require 45 W for 19" display.
2	CRT's are heavier than LCD.	LCD monitors are lighter and thinner
3	They are mounted on table.	They can be mounted on the wall.
4	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.
5	CRT displays text is not good as LCD.	LCD displays text better than CRTs.



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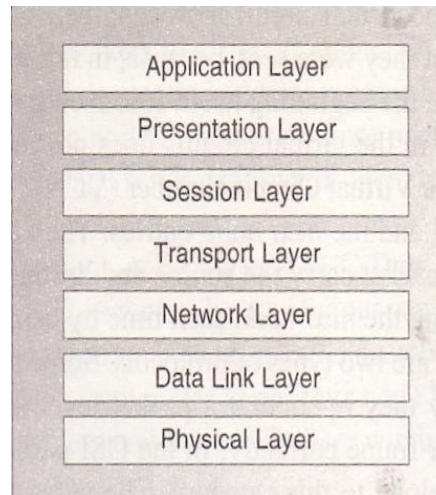
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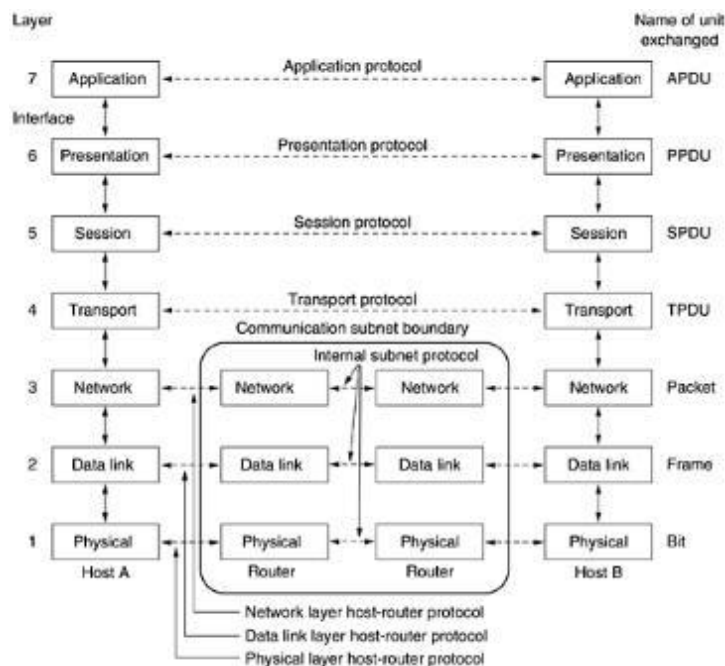
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d) Draw OSI Reference Model. State function of any two layers.  
(Diagram 2Marks, Any four functions of any two layers 2 Marks)

Ans:



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



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- 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.1B Attempt any one:**

**6M**

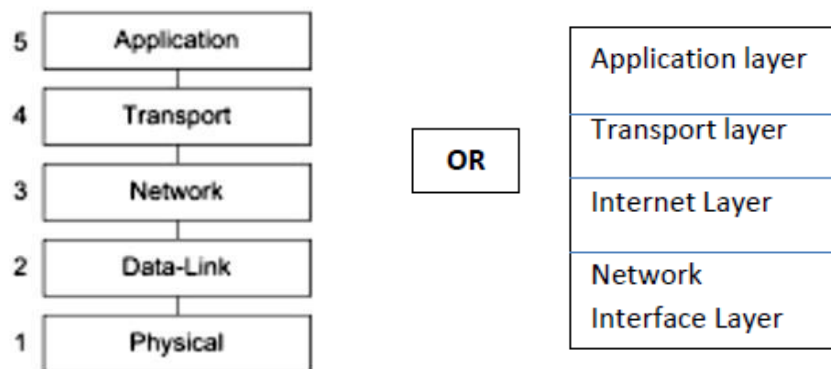
**a) Draw the TCP/IP Reference Model and state the function of various layers.**

*(Diagram: 2Marks; Explanation (Any 2 functions from each layer): 4Marks)*

**Note: Either 4 layer or 5 layer model may be considered.**

**Ans:**

TCP/IP reference Model:



**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 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



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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:**

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.

**b) List classification of network on basis of geographical area. State the benefits of networks.**

*(List 2 Marks, Any 8 Benefits 1/2 Mark each)*

**Ans:**

Computer Networks are classified based on the geographical area into

- Local Area Network
- Metropolitan Area Network
- Wide Area Network
- Campus Area Network (CAN)
- Personal Area Network (PAN)

**Benefits of network:**

- Resource Sharing
- Reducing cost
- Application services
- High Reliability
- Improved security
- Centralized management.
- E-mail
- Flexible access.

**OR**



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- **Sharing information:** Networks allow users to share information in several different ways. The most common way of sharing information is to share individual files.
- **Communication :** Networks allow users to communicate with each other in various ways. For example, messaging applications let network users exchange messages with each other using an e-mail, messaging, conferencing etc.
- **Sharing resources:** Certain computer resources, such as printers or hard drives, can be set up so that network users can share them. Sharing these resources can result in significant cost savings. Resource can be network connections (internet) also, where a single connection can be shared among various computers.
- **Sharing applications:** One of the most common reasons for networking is that several users can work together on a single application. A single application can be shared and hence the cost of installation, maintenance reduces and also makes it easier to manage these applications.

**Q.2 Attempt any four:**

**16M**

**a) List four characteristics of display and define them.**

*(Any four characteristics 1mark each)*

**Note: Any other relevant characteristics of display shall be considered**

**Ans: Characteristics of display:**

- 1. Dot pitch:** It is the distance between each group (triad) of red, blue and green phosphors. A smaller dot pitch helps produce sharper and clearer image
- 2. Resolution:** Resolution describes the number of potential pixels the monitor is capable of displaying. Resolution = Total Horizontal Pixels x Total vertical pixels
- 3. Video bandwidth:**
  - It is the highest input frequency a monitor can handle and helps in determining the resolution capabilities of the monitor .
  - The video bandwidth is measured in MHz.
  - Higher the video bandwidth , better the image quality.
  - Video Bandwidth = Hor. Pixel X Ver. Pixel X Frame rate
- 4. Horizontal scanning:** Scanning of the electron beam on the screen of the monitor is called raster scanning. The tracing of the horizontal lines in synchronism with H – Sync pulse is called Horizontal Scanning
- 5. Barrel distortion** Barrel distortion is opposite of pin cushioning. The vertical sides of the sides of the display area curve outwards with convex edge.
- 6. Pixels** A pixel is made of a triad. Pixels are arranged in an array of rows. Each row forms a scan line. Pixel resolution is the combination pixels in each row and number of rows for a given screen.
- 7. Triad** A triad consist of set of red, green and blue phosphors arranged in a triangle. The red gun excites red phosphor, the green gun excites blue phosphor, the blue gun excites blue phosphor. This triad produces a single color which is a combination of three excited phosphors.





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- 8. Refresh Rate:** rate at which electronics in the monitor address the brightness of each pixel on the screen.
- 9. Response time:** Time taken by throughput of a pixel to fully react to a change in its brightness.

**b) Write preventive maintenance procedure of (i) Keyboard (ii) Hard disk**

*(Any four maintenance procedure of Keyboard- 2Marks; Any four maintenance procedure of Hard Disk – 2marks)*

**Note: Any other relevant maintenance procedure shall be considered.**

**Ans:**

**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.

**c) List any two problems of PC with its troubleshooting.**

*(Any two problems with troubleshooting 2Marks each)*

**Note: Any other relevant problem may be considered)**

**Ans:**

**1. Problem: System is dead**



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**Troubleshooting:**

- a. Check for proper 230V ac supply using multimeter.
- b. Check if the power supply cable fits properly or not. Change if necessary.
- c. Check for the proper outputs (plus/minus) 5V, (plus/minus) 12V, PGS, GND from the SMPS.
- d. Repair/ Replace SMPS if necessary.

**2. Problem: Complete non operation of the keyboard. “KEYBOARD FAILURE” message is displayed when booting.**

**Troubleshooting:**

- a. Check if the keyboard is connected properly.
- b. Check if the keyboard works in any other position. In that case the cable may be broken at some place.
- c. Repair/ Replace the keyboard.

**3. Problem: Printer does not work.**

**Troubleshooting:**

- a. Check whether printer gets proper AC input.
- b. Check for proper fuses and replace if necessary.
- c. Check for ONLINE selection.
- d. Check for proper cable connections.

**4. Problem: System won't boot up.**

**Troubleshooting:**

- a. Check if the HDD is connected properly, all cables are secured and fitted and HDD settings are proper to make it a master device.
- b. Check if the HDD is detected in the CMOS setup.
- c. Check whether BIOS is able to find the HDD at booting time. If not the HDD MBR may be missing or bad.
- d. Check if the correct partition is set active for booting. If not select the correct partition

**d) Define IP Addressing. List IP Address classes with their range.**

**(Definition: 2Marks; Classes with range: 2Marks)**

**Note: Explanation not expected.**

**Ans:**

**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



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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 <sup>st</sup> Octet (Decimal)	1 <sup>st</sup> 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

e) Name the different TCP/IP Protocols. Explain the working of FTP.

(Any four TCP/IP Protocols 1Mark, Diagram 1 Mark FTP working: 2Marks)

Ans:

### 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)

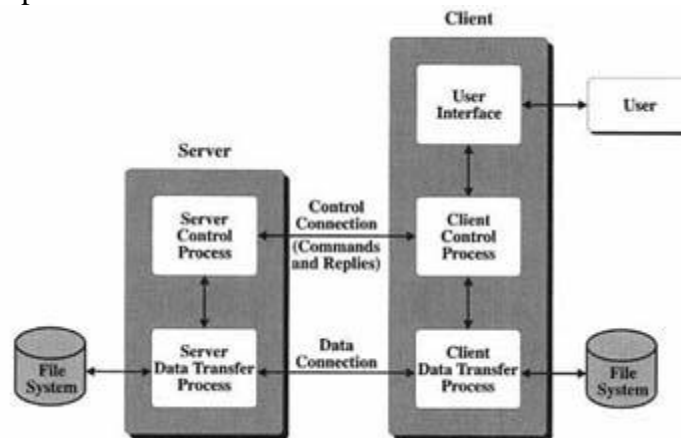


12. ICMP (Internet Control Message Protocol)
13. ARP (Address Resolution Protocol)
14. RARP (Reverse Address Resolution Protocol)
15. IGMP (Internet Group Management Protocol).
16. Ethernet, Token Ring, FDDI, X.25, Frame Relay

### 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.



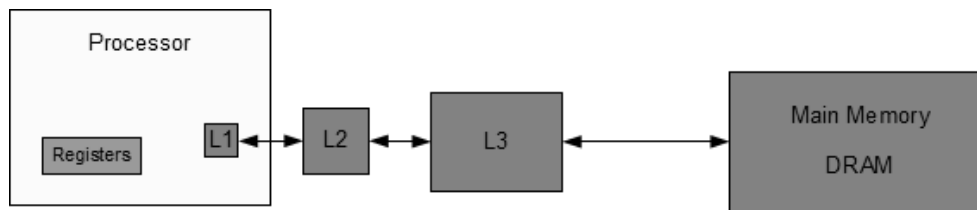
Q.3 Attempt any two:

16M

a) What is cache memory? What are its types? With the help of neat diagram explain the working principle of cache.

(Explanation 2 Marks, Types 2Marks, Diagram 2 Marks, Working 2Marks)

Ans:



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.

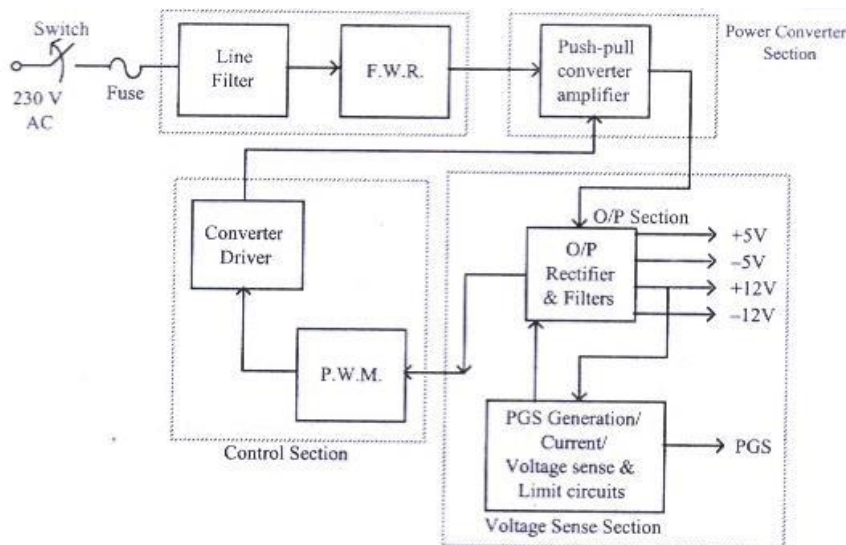


- Pentium 4 Extreme Edition was the first desktop PC processor with L3 cache.
- Later Editions of same processor were introduced with larger L2 cache rather than L3 cache

**b) Draw block diagram of SMPS and state the function of the blocks.**

*(Diagram 4 Marks, functions of each block 4 Marks)*

**Ans:**



### 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.



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## **Voltage sense section**

It generates Power Good Signal (PGS). When all four voltage outputs (+5V, -5V, +12V, - !2V) 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.

## **c) List networking devices. State the function of any four devices.**

*(Listing 2 Marks, functions of any four devices 6Marks)*

**Ans:** 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.



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**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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