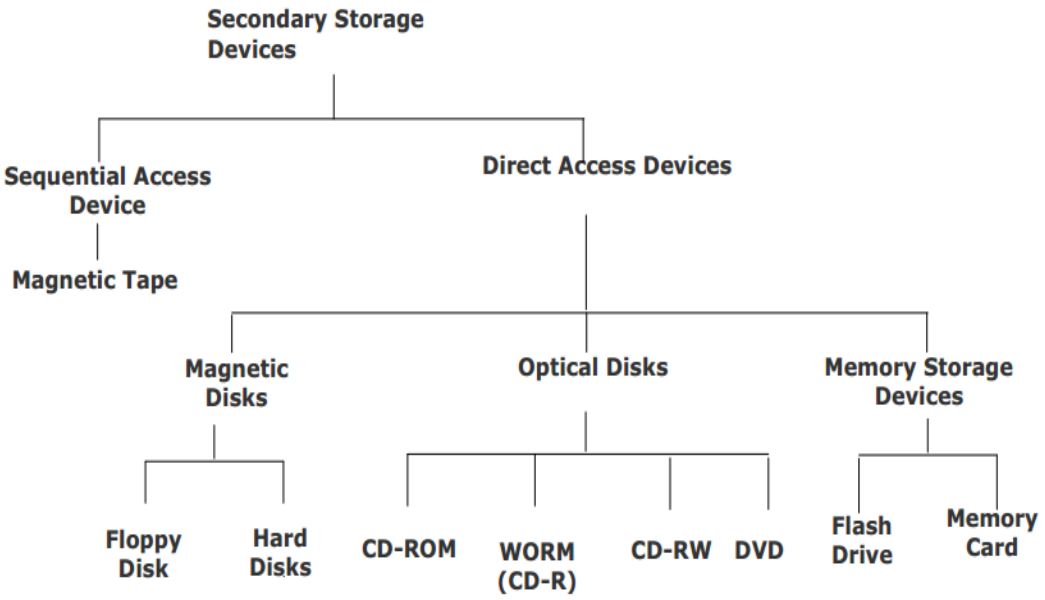
IT-110 Computer Organization

Assignment-4 solutions

5 marks

1.Classify different Secondary Storage Devices?



2. Explain about the different I/O Techniques?

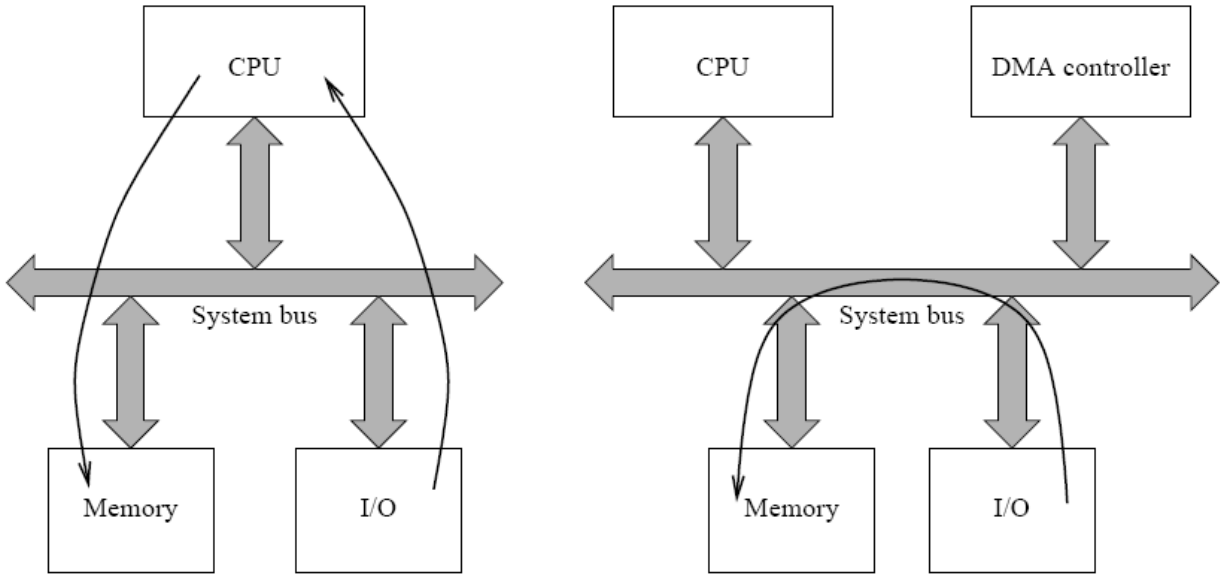
1. Programmed I/O (PIO).

I/O ports provide the basic access to I/O devices via the associated I/O controller. We still will have to devise ways to transfer data between the system and I/O devices using the I/O ports. A simple way of transferring data is to ask the processor to do the transfer. In this scheme of things, the processor is responsible for transferring data word by word. Typically, it executes a loop until the data transfer is complete. This technique is called *programmed I/O* (PIO).

One disadvantage of programmed I/O is that it wastes processor time. Another problem is that high priority devices are not checked until the CPU is finished with its current I/O task, which may have a low priority.

2. DIRECT MEMORY ACCESS (DMA)

DMA is implemented by using a DMA controller. The DMA controller acts as a slave to the processor and receives data transfer instructions from the processor. Figure shows the difference between programmed I/O and DMA transfer. In programmed I/O, the system bus is used twice as shown in below figure. The DMA transfer not only relieves the processor from the data transfer but also makes the transfer process more efficient by transferring data directly from the I/O device to memory

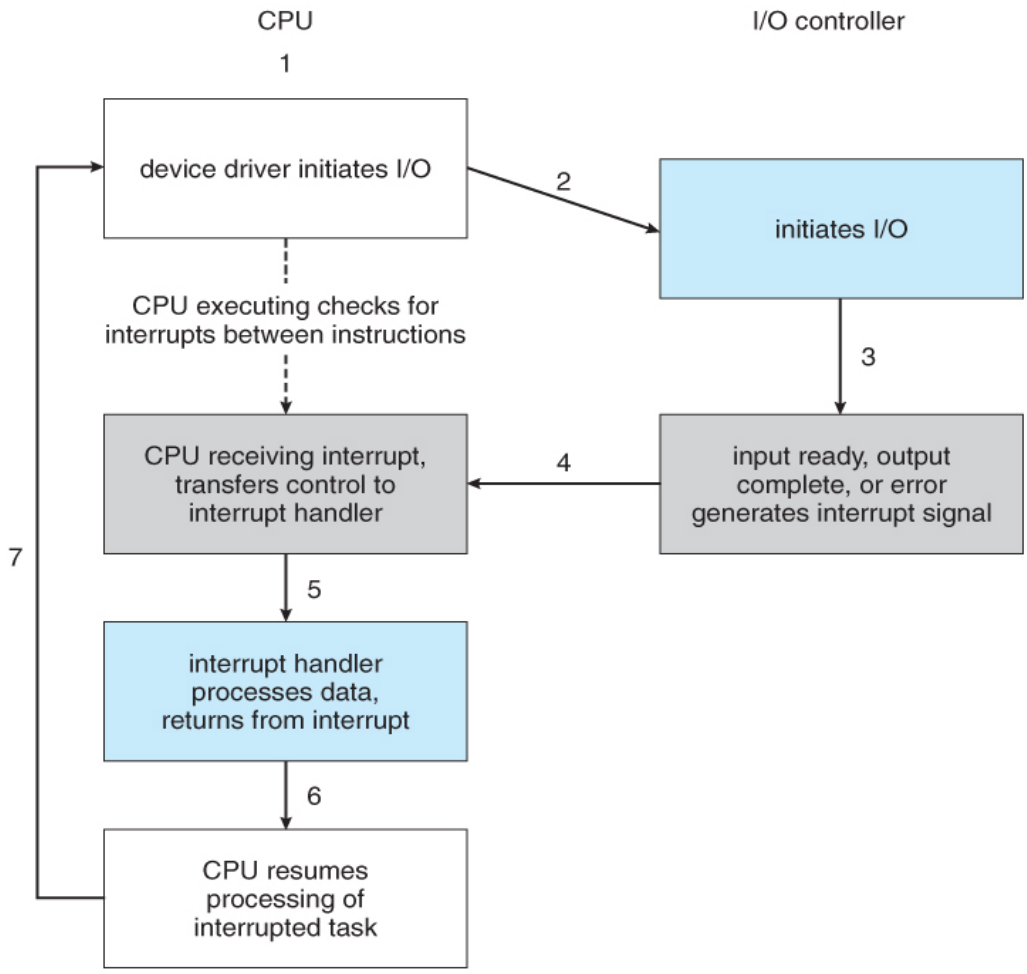


(a) Programmed I/O transfer (b) DMA transfer

Data transfer from an I/O device to system memory: (a) in programmed I/O, data are read by the processor and then written to the memory; (b) in DMA transfer, the DMA controller generates the control signals to transfer data directly between the I/O device and memory.

3. INTERRUPT-DRIVEN I/O.

When the CPU is interrupted, it is required to discontinue its current activity, attend to the interrupting condition (serve the interrupt), and then resume its activity from wherever it stopped. Discontinuity of the processor's current activity requires finishing executing the current instruction, saving the processor, and transferring control (jump) to what is called the interrupt service routine (ISR). The service offered to an interrupt will depend on the source of the interrupt. For example, if the interrupt is due to power failure, then the action taken will be to save the values of all processor registers and pointers such that resumption of correct operation can be guaranteed upon power return. In the case of an I/O interrupt, serving an interrupt means to perform the required data transfer. Upon finishing serving an interrupt, the processor should restore the original status by popping the relevant values from the stack. Once the processor returns to the normal state, it can enable sources of interrupt again



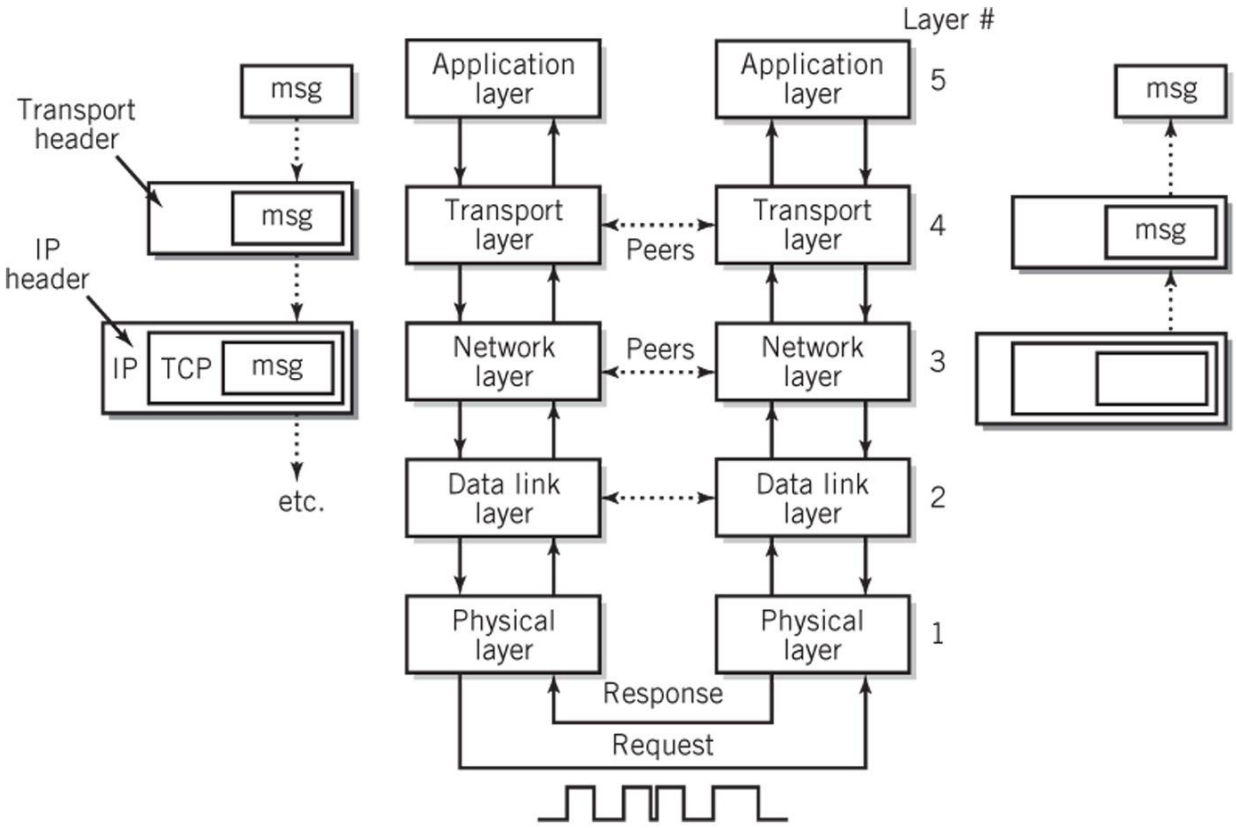
Question-3. Describe TCP/IP Network Model with diagram and Explain its Layers.

Answer:

TCP/IP Introduction:

- Transmission Control Protocol/Internet Protocol
- Based on five protocol layers, although layers 1 and 2 are not actually specified in the standard. However, the TCP/IP model recognizes the existence of these layers as a necessity.
- The TCP/IP protocol suite encompasses an integrated suite of numerous protocols that work together and guide all aspects of communication.

Operation of TCP/IP Model:



Application Layer (Layer 5):

- Layer where message is created
- Includes any application that provides software that can communicate with the network layer
- Sockets
    - Originated with BSD UNIX
    - Provide the interface between the application layer and transport layer
    - Used by applications to initiate connections and to send messages through the network
    - A means for adding new protocols and keeping the network facilities current in their offerings
    - Example: SCSI over IP

Transport Layer (Layer 4):

- Provides services that support reliable end-to-end communications
- Generates the final address of the destination
- Responsible for all end-to-end communication facilities
- Packetization of the message, breaking up of the message into packets of reasonable size takes place at this level
- Three different protocols
    - TCP
    - UDP
    - SCTP

Network Layer (Layer 3):

- The TCP/IP network layer is also called the internetworking layer or the IP layer
- Responsible for the addressing and routing of packets to their proper and final destination
- Unreliable, connectionless, packet switching service
- Does not guarantee delivery nor check for errors
- Routers and gateways are sometimes referred to as level 3 switches to indicate the level at which routing takes place

Data Link Layer (Layer 2):

- Responsible for the reliable transmission and delivery of packets between two adjacent nodes
- Packets at this layer are called *frames*
- Often divided into the following two sublayers:
    - Software logical link control sublayer
        - Error correction, flow control, retransmission, packet reconstruction and IP datagram/frame conversions
        - Numbers frames and reorders received frames to recreate the original message
        - Rarely used
    - Hardware medium-access control sublayer
        - Defines procedures for access the channel and detecting errors
        - Responsible for services such as data encoding, collision handling, synchronization, and multiplexing

Physical Layer (Layer 1):

- Layer at which communication actually takes place consisting of a bare stream of bits
- Primarily implemented in hardware by a network interface controller (NIC)
- Physical access protocol includes
    - Definition of the medium
    - Signaling method, signal parameters, carrier frequencies, lengths of pulses, synchronization and timing issues
    - Method used to physically connect the computer to the medium