



### Solution – 4

**(1) Ans = D**

Cache memory, also called CPU memory, is a random access memory that a computer microprocessor can access more quickly than it can access regular RAM.

**(2) Ans – D**

In contiguous allocation files are assigned to contiguous areas of secondary storage

In linked list allocation each file is linked list of disk blocks

In indexed allocation each file is associated with its own index block which is an array of disk block pointers.

**(3) Ans – C**

During the DMA (Direct Memory Access) Transfer, the microprocessor is in an idle state. Hence It will not perform any operations like read the data or write the data.

**(4) Ans – A**

Effective Memory Access Time = Cache hit ratio\*Cache access time + Cache miss\*( Cache miss penalty + Memory access time)

$$= 0.8*(30) + (1 - 0.8)*(30 + 150) \text{ ns}$$

$$= 24 + 0.2*(180) \text{ ns} = 60 \text{ ns}$$

**(5) Ans – A**

**(6) Ans – C**

A **minicomputer** is a type of computer that possesses most of the features and capabilities of a large computer but is **smaller in physical size**.

**(7) Ans – C**

When data is read from memory, the stored data is extracted (removed) from memory and in the process, the data is erased in the source. Because the data is lost, the process is referred to as destructive readout. If it is desired to restore the same data at the same storage location, the word must be rewritten after reading. Read/write memory such as a core memory is an example of destructive readout.

**(8) Ans – C**

The process of starting a computer is known as bootstrapping.

During the bootstrapping process, the computer runs a self-test and loads a boot program into the memory from the boot device.

The boot program loads the kernel and passes the control to the kernel.

**(9) Ans – A**

In C, &variable\_name will hold the address of a variable in the memory, where & is commonly called the reference operator.

e.g. for int p, &p stores its address in the memory.

**(10) Ans – B**

Types of Interrupts: There are three major types of interrupts that cause a break in the normal execution of a program. They can be classified as:

1. External interrupts
2. Internal interrupts
3. Software interrupts

**(11) Ans – A**

SISD stands for single instruction, single data

SISD is a uniprocessor machine capable of executing a single instruction, which operates on single data stream.

Von neumann computer architecture is SISD

**(12) Ans – A**

Scratchpad memory (SPM) or local store is a high-speed internal memory used for the temporary storage of calculations, data, and other work in progress

**(13) Ans – A**

A stack is a place in memory for storing data sequentially.

The address of the stack top is given by stack pointer.

**(14) Ans – D**

In implied mode, the operands are specified implicitly in the definition of the instruction.

**(15) Ans – D**

**Data access time:** It is the total time required to access the data. It means the total time required to read/write the data from the disk.

Data access time = Seek time + Rotational latency + Data transfer time



**(16) Ans – B**

Therefore, number of sets =  $2^x$

Number of blocks =  $2^y$

Cache size = Number of sets \* Number of Lines per set \* Block size

$$2^{18} = 2^x * 4 * 2^y$$

$$2^{x+y} = 2^{16}$$

$$x+y = 16 \text{ bits}$$

Therefore, width of physical address =  $6 + 16 = 22 \text{ bits}$

Memory size =  $2^{22} = 4 \text{ MB}$

**(17) Ans – D**

A **registered jack (RJ)** is a standardized telecommunication network interface for connecting voice and data equipment to a service provided by a local exchange carrier or long-distance carrier.

For example, **RJ11**, **RJ14**, and **RJ25** are the most commonly used interfaces for telephone connections for one, two, and three-line service, respectively.

**RJ45** is a type of **connector** commonly used for Ethernet networking.

**(18) Ans – B**

**(19) Ans – B**

- The surfaces are usually divided into concentric rings called tracks.
- Tracks are divided into sectors.
- A sector is the smallest memory unit on the disk.
- The data size of sector is always a power of two ( General : 512 Bytes )
- Each track contains the same number of sectors.

(20) Ans – B

Given:

Memory size = 4 GB

No. of data lines = Bits required for word

= 2 Bytes

Memory size =  $2^{\text{no. of address lines}} \times \text{No. of data lines}$

4 GB =  $2^{\text{no. of address line}} \times \text{Bytes}$

$$\frac{2^2 \cdot 2^{30}}{2} = 2^{\text{no. of address line}}$$

$$2^{\text{No. of address line}} = 2^{31}$$

No. of address lines = 31

(21) ANS – C

**MS-DOS (Microsoft Disk Operating System)** is the **oldest Textual User Interface (TUI) operating system** created by **Microsoft Corporation**.

(22) ANS – C

**Disk Defragmenter** is a utility in Microsoft Windows designed to increase access speed by rearranging files stored on a disk to occupy contiguous storage locations, a technique called defragmentation.

**(23)      ANS – A**

**Explanation:** `chmod` will say to command line that we are going to change the permissions of the `file_name`. `+w` means we are going to add write permissions for the owner of the `file_name`. `file_name` will be the name of the file or path to the file whose permissions are being changed. Hence, `chmod +w file_name`.

**(24)      ANS- A**

In a physical memory location, when a program is combined instruction and data then it is referred to as the address binding. Now, when a process is shifted from one memory block to another physical address with all the instructions and the data, then the binding must be delayed until the run time.

**(25)      ANS- C**

Paging is a memory management strategy that avoids the necessity for contiguous physical memory allocation. This approach allows a process's physical address space to be non-contiguous.

**(26)      ANS- C**

**(27)      ANS- A**

**Total memory requirement:**

For  $A \rightarrow B \rightarrow D = 2 + 3 + 9 = 14$  KB

For  $A \rightarrow B \rightarrow E = 2 + 3 + 8 = 13$  KB

For  $A \rightarrow C \rightarrow F = 2 + 4 + 7 = 13$  KB

For  $A \rightarrow C \rightarrow G = 2 + 4 + 5 = 11$  KB

As we can see, the largest program part size is 14 KB. Hence, we need 14 KB maximum size to run the given program



(28)      **ANS – A**

**Linux** is an **open-source** Unix-like **operating system** based on the Linux kernel, an operating system kernel first released by Linus Torvalds on September 17, 1991.

- Linux is usually packaged as a Linux distribution.
- Linux is a multitasking and multiprocessing operating system.

(29)      **ANS- C**

**Base Register:** Stores the starting address of the program.

**Limit Register:** Stores the ending address of the program.

(30)      **ANS – C**

A well-liked independent portable operating system is Linux. It is a multitasking operating system with features including memory management, shared virtual memory libraries, TCP/IP network capabilities, and features seen in common operating systems.

(31)      **ANS- B**

(32)      **ANS – B**

Each file or directory has a unique identifier that is typically referred to as an **I-Node**, as well as its name and the directory in which it is located.

(33)      **ANS – C**

(34)      **ANS – C**

The **operating system** must hide the **hardware** specifications from application software and, by extension, from the user.

(35)      **ANS- A**

(36)      **ANS – D**

(37)      **ANS- C**

**Page Fault:** This fault is generated when a page that is being referenced by a process is not present in the main memory. After this fault is raised, OS finds the page in virtual memory and then brings it to the main memory.

(38)      **ANS – D**

A **disk operating system** (abbreviated DOS) is a computer operating system that resides on and can **use a disk storage device**, such as a floppy disk, hard disk drive, or optical disc.

(39)      **ANS – C**

**Real-time system-** The system which is strict and deadly time bound is called a real-time system.

(40)      **ANS – A**

(41)      **ANS – B**

An operating system (OS) is system software that **manages computer hardware and software resources** and provides common services for computer programs.

The three most common operating systems for personal computers are **Microsoft Windows, Mac OS X, and Linux.**

(42)      **ANS- C**

**Unix is a family of multitasking**, multiuser computer operating systems that derive from the original AT&T (American Telephone and Telegraph Company) Unix

Multitasking is the concurrent execution of processes by the processor over a certain period



**(43)      ANS – D**

Windows has never been open source, never available for free, and people have never been allowed to change the code for free and do with it what they wanted. So in that way, windows were never open.

**(44)      ANS – A**

Bootting is a **startup sequence** that starts the **operating system** of a **computer** when it is turned on. A boot sequence is the **initial set of operations** that the computer performs when it is switched on. Every computer has a boot sequence.

**(45)      ANS – C**

The kernel is unaware of the user-level threads because they are implemented at the user level.

**(46)      ANS – A**

**(47)      ANS – C**

Process Identifier: In computing, the process identifier (normally referred to as the process ID or just PID) is a number used by most operating system kernels.

**(48)      ANS – D**

An operating system (OS) is a software program that connects a computer user to its hardware. Disk initialization, booting from the disc, and bad-lock recovery are all handled by an operating system.

(49)      **ANS – D**

**Basic Input Output System** is a program used as an interface between the operating system and the motherboard. It is the program used by the microprocessor that manages data flow between the computer's operating system and an attached device such as hard disk, keyboard, adaptor, mouse, printer, etc.

(50)      **ANS – B**

(51)      **ANS – C**

(52)      **ANS – A**

Transmission media are located below the physical layer and are directly controlled by it.

(53)      **ANS – B**

In **packet-switched networks**, these resources are not reserved, rather Simply in each packet mark the source address and destination and throw them in the network. These packets might not follow the same path.

**ARPANET:**

The Advanced Research Projects Agency Network was established by the **Advanced Research Projects Agency (ARPA)** of the United States Department of Defense.

(54)      **ANS – D**

A twisted pair cable is made of **two plastic insulated copper wires twisted together to form a single media.**

(55)      **ANS – A**

(56)      **ANS – C**

Coaxial cable, twisted pair cable, and optical fibre cables are guided media where as electric cable is not used in computer networks.

Twisted pair cable: 100 Mbps

Coaxial cable: 10 Mbps

Optical fibre: 2 Gbps

**(57)      ANS – A**

**Synchronous Media** involves the communication process with all the communicants present at the same time.

**(58)      ANS – D**

Data Transmission can be done through channel media in Half Duplex, Full Duplex Simplex mode. These are the basic form of Data transmission in data switching technology.

---

**(59)      ANS – D**

Data communications refer to the transmission of data between two or more computers and a computer network.

The physical connection between computing devices is established using either cable media or wireless media.

**(60)      ANS – D**

**(61)      ANS – D**

In computer architecture, a bus is a subsystem that transfers data or power between computer components inside a computer or between computers. A bus can logically connect several peripherals over the same set of wires. Each bus defines its set of connectors to physically plug devices, cards or cables together.

**(62)      ANS – D**

**(63)      ANS – B**

Bigger block size implies better spatial locality. Block size doesn't depend on cache tag. Smaller block size incurs a lower cache miss penalty.

**(64)      ANS – B**



**(65)      ANS – C**

**Pre-emptive** is the most suitable scheduling scheme for the real-time operating system

**(66)      ANS – A**

**(67)      ANS – A**

Relationship between m and n is  $n = 2^m$

Let's understand with a small example If we have memory or addressable unit is 1024 Byte or word,

then we need 10 bits to address complete memory.

**(68)      ANS – B**

Assume each stage take 1 Cycle(C)

Non-pipeline

Time taken ( $T_{wp}$ ) = number of stage  $\times$  number of task

$T_{wp} = m \times n$  cycle

For pipeline

task = n

Stage = m

1 task take m cycle and (n -1) takes cycle

Time taken( $T_p$ ) = (m + n -1) cycle

$$S_{up} = \frac{T_{wp}}{T_p} = \frac{mn}{m+n-1}$$

(69)      **ANS – B**

**Hardwired v/s micro-programmed control unit:-** To execute an instruction, the control unit of the CPU must generate the required control signal in the proper sequence. There are two approaches used for generating the control signals in proper sequence as Hardwired Control unit and the Micro-programmed control unit.

(70)      **ANS – B**

**Instructions Register :-** In computing, the instruction register (IR) or current instruction register (CIR) is the part of a CPU's control unit that holds the instruction currently being executed or decoded.

(71)      **ANS – B**

(72)      **ANS – C**

**Serial** peripheral interface (**SPI**) and inter-integrated circuit (**I2C**) are the two standard synchronous **serial** protocols that are widely used and accepted for **serial communication**

(73)      **ANS – C**

(74)      **ANS – A**

(75)      **ANS – D**

(76)      **ANS – A**

(77)      **ANS – C**

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.

(78)      **ANS – B**

A non-blocking system call **does not halt** the execution of an application.

After initiating an operation, the non-blocking system calls put it on the operating system to **run immediately** without generating any results.

**(79)      ANS – B**

Hardware mechanism that enables a device to notify the CPU is called interrupt

**(80)      ANS – D**

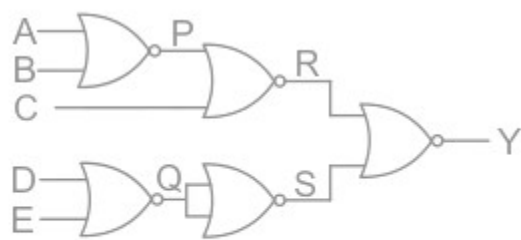
**(81)      ANS – A**

Function Table for D: Flip flop:

D	$Q_n$	$Q_{n+1}$
0	0	0
0	1	0
1	0	1
1	1	1



**(82) ANS- A**



$$P = \overline{A + B}$$

$$Q = \overline{D + E}$$

$$R = \overline{P + C} = \overline{\overline{A + B} + C}$$

$$S = \overline{Q + \bar{Q}} = \bar{Q} = D + E$$

$$Y = \overline{R + S} = \bar{R} \bar{S}$$

$$Y = (\overline{A + B + C}) \overline{(D + E)}$$

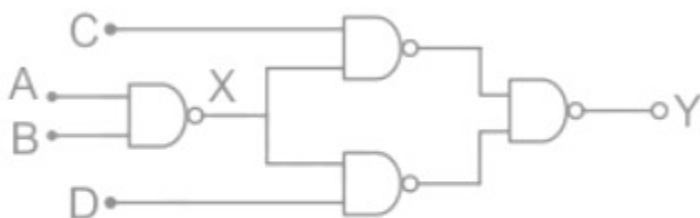
$$Y = (\overline{A + B + C}) (\bar{D} \bar{E})$$

**(83) ANS – D**

MOD-4 counter followed by MOD-16 it denotes cascading of two counters. Therefore, equivalent counter = MOD (4 × 16) counter = MOD-64 counter

Hence the number of states when a MOD-2 counter is followed by a MOD-5 counter is 10

**(84) ANS – A**



Hence, 4 NAND gates will be used in all.

(85)      **ANS – C**

Function of logic gate is  $\overline{A} \cdot B \cdot C$

If  $A = 0$ ,  $B = 1$ ,  $C = 1$

then  $f = 0$



\*\*\*\*\*