BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

Set – A

School of Computing Skills

Session: 2021-22 (Winter Semester)

B. Voc. Program, 1st Semester

End-Sem. Examination

Course Code: ITN 1101 **Time: 2 Hours**

Course Name: Introduction to Computer **Max. Marks: 50**

Instruction: (if any)

Section – A

10X01 = 10 Marks

Q1. The physical devices of a computer:

(A) Software (B) Package

(C) Hardware (D) System Software

Q2. The binary equivalent of the decimal number 10 is_____.

(A) 0010 (B) 10

(C) 1010 (D) 010

Q3. Computer language that is written in binary codes only is_____.

(A) Machine Language (B) C

(C) C# (D) Pascal

Q4. The input hexadecimal representation of 1110 is _____.

(A) 0111 (B) E

(C) 15 (D) 14

Q5. Convert the binary equivalent 10101 to its decimal equivalent.

(A) 21 (B) 12

(C) 22 (D) 31

Q6. Which of the following is not a binary number?

(A) 1111 (B) 101

(C)11E (D) 000

Q7. Which of the following is the correct representation of a binary Number?

(A) $(124)^2$ (B) 1110

(C) $(110)_2$ (D) $(000)_2$

Q8. If the decimal number is a fraction then its binary equivalent is obtained by _____ the number continuously by 2.

(A) Dividing (B) Multiplying

(C) Adding (D) Subtracting

Q9. The octal number 645 in power of 8 is equal to The octal number 645 in power of 8 is equal to.

(A) 450 (B) 451

(C) 421 (D) 501

Q10. $(170)_{10}$ is equivalent to$(170)_{10}$ is equivalent to

(A) $(FD)_{16}$ (B) $(DF)_{16}$

(C) $(AA)_{16}$ (D) $(AF)_{16}$

Section – B

04X04 = 16 Marks

Q1. What are the characteristics and basic operation of Computer?

Q2. Explain the Various types of input devices of computer.

Q3. Convert the binary number 11101111 to decimal.

Q4. Convert 12_8 into a binary number.

Section – C

04X06 = 24 Marks

Q1. Explain the Pin Diagram of 8085 Microprocessor.

Q2. Convert the binary number 100111001 to hexadecimal.

Q3. What are difference between RAM and ROM?

Q4. What are difference between microprocessor and microcontroller?

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Section – A

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Q1. The physical devices of a computer:

(A) Software (B) Package

(C) Hardware (D) System Software

Ans: (C)

Q2. The binary equivalent of the decimal number 10 is_____.

(A) 0010 (B) 10

(C) 1010 (D) 010

Ans: (C)

Q3. Computer language that is written in binary codes only is_____.

(A) Machine Language (B) C

(C) C# (D) Pascal

Ans: (A)

Q4. The input hexadecimal representation of 1110 is _____.

(A) 0111 (B) E

(C) 15 (D) 14

Ans: (B)

Q5. Convert the binary equivalent 10101 to its decimal equivalent.

(A) 21 (B) 12

(C) 22 (D) 31

Ans: (A)

Q6. Which of the following is not a binary number?

(A) 1111 (B) 101

(C)11E (D) 000

Ans: (C)

Q7. Which of the following is the correct representation of a binary Number?

(A) $(124)^2$ (B) 1110

(C) $(110)_2$ (D) $(000)_2$

Ans: (D)

Q8. If the decimal number is a fraction then its binary equivalent is obtained by _____ the number continuously by 2.

(A) Dividing (B) Multiplying

(C) Adding (D) Subtracting

Ans: (B)

Q9. The octal number 645 in power of 8 is equal to The octal number 645 in power of 8 is equal to.

(A) 450 (B) 451
(C) 421 (D) 501

Ans: (C)

Q10. $(170)_{10}$ is equivalent to$(170)_{10}$ is equivalent to

(A) $(FD)_{16}$ (B) $(DF)_{16}$
(C) $(AA)_{16}$ (D) $(AF)_{16}$

Ans: (C)

Section – B

04X04 = 16 Marks

Q1. What are the characteristics and basic operation of Computer?

Ans: The characteristics of the computers are

- Speed
- Accuracy
- Automation
- Endurance
- Versatility
- Storage
- Cost reduction etc

The basic operations of the computer are

- Input,
- Process
- Storing
- Controlling and
- Output

Q2. Explain the Various types of input devices of computer.

Ans: They are split into two categories manual input devices and direct input devices.

Manual Input devices: Data is input into the computer by hand. Manual input devices require humans to do most of the work needed to get data into the system.

Examples of Input Devices

- Keyboard. The keyboard is a prominent example of input devices. ...
- Mouse. A mouse is primarily a pointing device that takes the guided motion by the user as an input. ...
- Scanner. ...
- Microphone. ...
- Camera. ...
- Magnetic Ink Character Reader (MICR) ...
- Gamepad. ...
- Touch Screen.

Q3. Convert the binary number 11101111 to decimal.

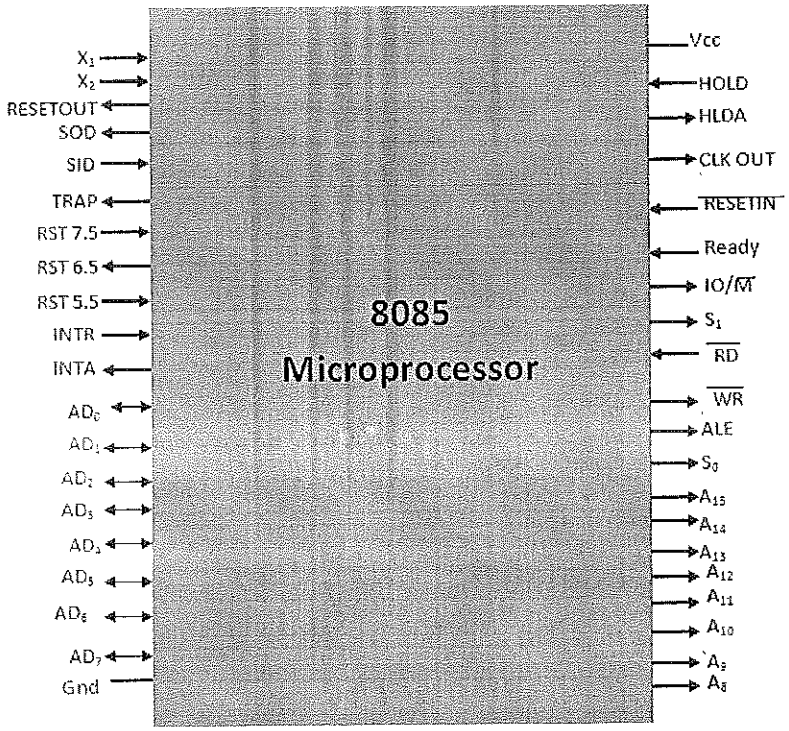
Ans:
Given binary number is 11101111
Using the conversion formula,
11101111 = $(1 \times 2^7) + (1 \times 2^6) + (1 \times 2^5) + (0 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$
= 128 + 64 + 32 + 0 + 8 + 4 + 2 + 1
= 239
Therefore, binary number 11101111 = 239 decimal number

Q4. Convert 12_8 into a binary number.
Ans:
Given, 12_8 is the octal number.
Now with the help of the table, we can write;
$12_8 = (001\ 010)_2$
Since zeros on the left, most of digit 1 does not have any significance. Thus,
$12_8 = (1010)_2$

Section – C

04X06 = 24 Marks

Q1. Explain the Pin Diagram of 8085 Microprocessor.



1. Address Bus and Data Bus:
The address bus is a group of sixteen lines i.e. A0-A15. The address bus is unidirectional, i.e., bits flow in one direction from the microprocessor unit to the peripheral devices and uses the high order address bus.

2. Control and Status Signals:

3. Power Supply and Clock Frequency:
- **Vcc** – +5v power supply
- **Vss** – Ground Reference

4. Interrupts and Peripheral Initiated Signals:
The 8085 has five interrupt signals that can be used to interrupt a program execution.

(i) INTR
(ii) RST 7.5
(iii) RST 6.5
(iv) RST 5.5
(v) TRAP

5. Reset Signals:

- **RESET IN'** – When the signal on this pin is low (0), the program-counter is set to zero, the buses are tristated and the microprocessor unit is reset.

- **RESET OUT** – This signal indicates that the MPU is being reset. The signal can be used to reset other devices.

6. DMA Signals:

- **HOLD** – It indicates that another device is requesting the use of the address and data bus.
- **HLDA** – It is a signal which indicates that the hold request has been received after the removal of a HOLD request, the HLDA goes low.

7. Serial I/O Ports:

Serial transmission in 8085 is implemented by the two signals,
SID and SOD – SID is a data line for serial input whereas SOD is a data line for serial output.

Q2. Convert the binary number 100111001 to hexadecimal.

Binary to Hexadecimal

Convert 100111001_2 to hexadecimal:

$100111001_2 = 1\ 0011\ 1001 = 139_{16}$

binary 100111001	1	0011	1001	step 0
hexadecimal 139	1	3	9	step 1

Q3. What are difference between RAM and ROM?

Ans: RAM, which stands for random access memory, and ROM, which stands for read-only memory, are both present in your computer. RAM is volatile memory that temporarily stores the files you are working on. ROM is non-volatile memory that permanently stores instructions for your computer.

What is computer RAM?

RAM is volatile memory, which means that the information temporarily stored in the module is erased when you restart or shut down your computer. Because the information is stored

electrically on transistors, when there is no electric current, the data disappears. Each time you request a file or information, it is retrieved either from the computer's storage disk or the internet. The data is stored in RAM, so each time you switch from one program or page to another, the information is instantly available. When the computer is shut down, the memory is cleared until the process begins again. Volatile memory can be changed, upgraded, or expanded easily by users.

What is ROM?

ROM stands for non-volatile memory in computers., which means the information is permanently stored on the chip. The memory does not depend on an electric current to save data, instead, data is written to individual cells using binary code. Non-volatile memory is used for parts of the computer that do not change, such as the initial boot-up portion of the software, or the firmware instructions that make your printer run. Turning off the computer does not have any effect on ROM. Non-volatile memory cannot be changed by users.

Q4. What are difference between microprocessor and microcontroller?

ANS: Difference between Microprocessor and Microcontroller

The following table highlights the differences between a microprocessor and a microcontroller

Microcontroller	Microprocessor
Microcontrollers are used to execute a single task within an application.	Microprocessors are used for big applications.
Its designing and hardware cost is low.	Its designing and hardware cost is high.
Easy to replace.	Not so easy to replace.
It is built with CMOS technology, which requires less power to operate.	Its power consumption is high because it has to control the entire system.
It consists of CPU, RAM, ROM, I/O ports.	It doesn't consist of RAM, ROM, I/O ports. It uses its pins to interface to peripheral devices.

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Set – B

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Course Code: ITN 1101 **Time: 2 Hours**

Course Name: Introduction to Computer **Max. Marks: 50**

Instruction: (if any)

Section – A

10X01 = 10 Marks

Q1. The Octal equivalent of the decimal number $(417)_{10}$ is ____.

(A) $(641)_8$ (B) $(619)_8$

(C) $(640)_8$ (D) $(598)_8$

Q2. Convert the hexadecimal number $(1E2)_{16}$ to decimal.

(A) 480 (B) 483

(C) 482 (D) 484

Q3. $(170)_{10}$ is equivalent to_____.

(A) $(FD)_{16}$ (B) $(DF)_{16}$

(C) $(AA)_{16}$ (D) $(AF)_{16}$

Q4. Octal to binary conversion: $(24)_8$ =_____.

(A) $(111101)_2$ (B) $(010100)_2$

(C) $(111100)_2$ (D) $(101010)_2$

Q5. If you want to improve the performance of your PC, you need to upgrade the ____.

(A) CPU (B) Monitor

(C) Keyboard (D) Printer

Q6. Notebook PCs fall into a category of devices called _____.

(A) Mobile computer (B) Desktop computers

(C) Hybrid computers (D) Tabulators

Q7. Mechanical devices that make-up the computer are called _____.

(A) Software (B) Hardware

(C) Netware (D) Groupware

Q8. The first computer was programmed using_____.

(A) Assembly language (B) Machine language

(C) Source code (D) Object code

Q9. Base value of hexadecimal number system is_____.

(A) 2 (B) 10

(C) 16 (D) 8

Q10. Octal number equivalent to binary number 1110101 is_____.

(A) 117 (B) 75

(C) 165 (D) 175

Section – B

04X04 = 16 Marks

Q1. What is programming language? Explain its types.

Q2. How does a hard disk work and what are its uses?

Q3. Convert the equivalent octal form of F_{16}.

Q4. Convert the binary number 10100011 to decimal.

Section – C

04X06 = 24 Marks

Q1. Explain the different types of Computer Hardware.

Q2. Convert E_{16} to an equivalent binary number.

Q3. Explain the different types of Logic Gates.

Q4. Explain the different types of Computer Software.

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(A) $(641)_8$ (B) $(619)_8$

(C) $(640)_8$ (D) $(598)_8$

Ans: (A)

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(A) 480 (B) 483

(C) 482 (D) 484

Ans: (C)

Q3. $(170)_{10}$ is equivalent to_____.

(A) $(FD)_{16}$ (B) $(DF)_{16}$

(C) $(AA)_{16}$ (D) $(AF)_{16}$

Ans: (C)

Q4. Octal to binary conversion: $(24)_8$=_____.

(A) $(111101)_2$ (B) $(010100)_2$

(C) $(111100)_2$ (D) $(101010)_2$

Ans: (B)

Q5. If you want to improve the performance of your PC, you need to upgrade the ____.

(A) CPU (B) Monitor

(C) Keyboard (D) Printer

Ans: (A)

Q6. Notebook PCs fall into a category of devices called _____.

(A) Mobile computer (B) Desktop computers

(C) Hybrid computers (D) Tabulators

Ans: (A)

Q7. Mechanical devices that make-up the computer are called _____.

(A) Software (B) Hardware

(C) Netware (D) Groupware

Ans: (B)

Q8. The first computer was programmed using_____.

(A) Assembly language (B) Machine language

(C) Source code (D) Object code

Ans: (B)

Q9. Base value of hexadecimal number system is_____.

(A) 2 (B) 10

(C) 16 (D) 8

Ans: (C)

Q10. Octal number equivalent to binary number 1110101 is_____.

(A) 117 (B) 75

(C) 165 (D) 175

Ans: (B)

Section – B

04X04 = 16 Marks

Q1. What is programming language? Explain its types.

Ans: Programming languages define and compile a set of instructions for the CPU (Central Processing Unit) for performing any specific task. Every programming language has a set of keywords along with syntax- that it uses for creating instructions.

Till now, thousands of programming languages have come into form. All of them have their own specific purposes. All of these languages have a variation in terms of the level of abstraction that they all provide from the hardware. A few of these languages provide less or no abstraction at all, while the others provide a very high abstraction. On the basis of this level of abstraction, there are two types of programming languages:

- Low-level language
- High-level language

The primary difference between low and high-level languages is that any programmer can understand, compile, and interpret a high-level language feasibly as compared to the machine. The machines, on the other hand, are capable of understanding the low-level language more feasibly compared to human beings.

Q2. How does a hard disk work and what are its uses?

Ans: A computer hard disk drive (HDD) is a non-volatile data storage device. Non-volatile refers to storage devices that maintain stored data when turned off. All computers need a storage device, and HDDs are just one example of a type of storage device. HDDs are usually installed inside desktop computers, mobile devices, consumer electronics and enterprise storage arrays in data centers. They can store operating systems, software programs and other files using magnetic disks.

The hard drive is where all your permanent computer data is stored. Whenever you save a file, photo, or software to your computer, it's stored in your hard drive. Most hard drives have storage space between 250GB and 1TB.

Q3. Convert the equivalent octal form of F_{16}.

Ans: Given, a hexadecimal number is F.

$F_{16} = (F \times 16^0)$

$= F \times 1$

$= F$

$= 15$(Decimal form)

Now we have to convert this decimal to equivalent octal number;

8 | 15
8 | 1 -- 7
8 | 0 -- 1

The octal number is 17_8
Hence, $F_{16} = 17_8$

Q4. Convert the binary number 10100011 to decimal.
Ans:
Given binary number is 10100011
Using the conversion formula,
10100011 $= (1 \times 2^7) + (0 \times 2^6) + (1 \times 2^5) + (0 \times 2^4) + (0 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$
$= 128 + 0 + 32 + 0 + 0 + 0 + 2 + 1$
$= 163$

Section – C

04X06 = 24 Marks

Q1. Explain the different types of Computer Hardware.
Ans: Given below are the types of computer hardware:
1. RAM
RAM (Random Access Memory) is a type of computer hardware that is used to store the information and then process that information.

2. Hard disk

The hard disk is another type of computer hardware that is used to store the data in it. The hard disk can be pre-installed in CPU or can be used as an external device.

3. Monitor

For the computer hardware, the hardware is another device that is used to display the output, videos and other graphics as it is directly connected to the CPU. The video displayed by the monitor uses the video card.

4. CPU

CPU (Central processing unit) is the core hardware part of the computer system which is used to interpret and execute most of the commands using other computer parts i.e. software and hardware.

5. Mouse

It is a hand operator input device that is used to point something on the screen. The mouse can be wired or wireless.

Q2. Convert E_{16} to an equivalent binary number.
Ans: Given, a hexadecimal number is E.
First, convert the given hexadecimal to the equivalent decimal number.
$E_{16} = E \times 16^0$
$= E \times 1$
$= E$
$=14$ (Decimal number)
Now we have to convert 14_{10} to binary number.

2 |14
2 | 7 -- 0
2 | 3 -- 1
2 | 1 -- 1
2 | 0 -- 1

The binary number obtained is 1110_2
Hence, $E_{16} = 1110_2$

Q3. Explain the different types of Logic Gates.

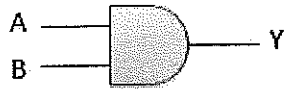
Logic gates are the basic building blocks of any digital system. It is an electronic circuit having one or more than one input and only one output. The relationship between the input and the output is based on a certain logic. Based on this, logic gates are named as AND gate, OR gate, NOT gate etc.

AND Gate

A circuit which performs an AND operation is shown in figure. It has n input (n >= 2) and one output.

Y = A AND B AND C ..... N
Y = A.B.C ..... N
Y = ABC ..... N

Logic diagram



Truth Table

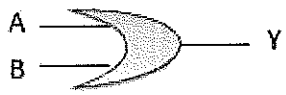
Inputs		Output
A	B	AB
0	0	0
0	1	0
1	0	0
1	1	1

OR Gate

A circuit which performs an OR operation is shown in figure. It has n input (n >= 2) and one output.

Y = A OR B OR C ..... N
Y = A + B + C ..... N

Logic diagram



Truth Table

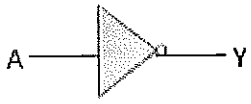
Inputs		Output
A	B	A + B
0	0	0
0	1	1
1	0	1
1	1	1

NOT Gate

NOT gate is also known as Inverter. It has one input A and one output Y.

Y = NOT A
Y = $\overline{A}$

Logic diagram



Truth Table

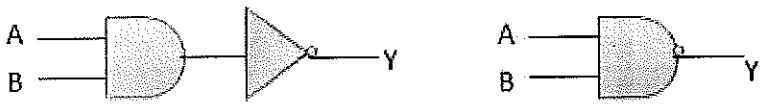
Inputs	Output
A	B
0	1
1	0

NAND Gate

A NOT-AND operation is known as NAND operation. It has n input (n >= 2) and one output.

Y = A NOT AND B NOT AND C ..... N
Y = A NAND B NAND C ..... N

Logic diagram



Truth Table

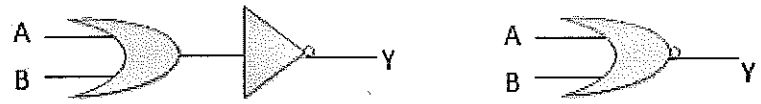
Inputs		Output
A	B	$\overline{AB}$
0	0	1
0	1	1
1	0	1
1	1	0

NOR Gate

A NOT-OR operation is known as NOR operation. It has n input (n >= 2) and one output.

Y = A NOT OR B NOT OR C ..... N
Y = A NOR B NOR C ..... N

Logic diagram



Truth Table

Inputs		Output
A	B	$\overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

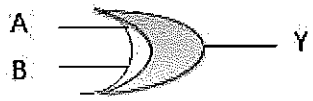
XOR Gate

XOR or Ex-OR gate is a special type of gate. It can be used in the half adder, full adder and subtractor. The exclusive-OR gate is abbreviated as EX-OR gate or sometime as X-OR gate. It has n input (n >= 2) and one output.

Y = A XOR B XOR C ..... N
Y = $A \oplus B \oplus C$ ..... N

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

Logic diagram



Truth Table

Inputs		Output
A	B	$A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

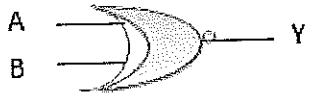
XNOR Gate

XNOR gate is a special type of gate. It can be used in the half adder, full adder and subtractor. The exclusive-NOR gate is abbreviated as EX-NOR gate or sometime as X-NOR gate. It has n input (n >= 2) and one output.

Y = A XOR B XOR C ..... N
Y = $A \ominus B \ominus C$ ..... N

Y = $\overline{A B + AB}$

Logic diagram



Truth Table

Inputs		Output
A	B	A ⊙ B
0	0	1
0	1	0
1	0	0
1	1	1

Q4. Explain the different types of Computer Software.

ANS: Now that we've covered the basic definition of software, let's look at the four main types of software and how they are used in life and in business.

Application Software: This is the most common type of computer software, and can be defined as end-user programs that help you perform tasks or achieve a desired outcome. The end-user is the person who is actually using a product or program.

System Software: System software helps the user, the computer or mobile device, and an application all work together seamlessly. This makes system software crucial to running any kind of application software as well as the whole computer system. Apple's iOS is an example of system software, as is Microsoft Windows. System software is always running in the background of your device, but it is never something you will use directly. In fact, the only time most people remember it's there is when it is time for an update.

Programming Software: While application software is designed for end-users, and system software is designed for computers or mobile devices, programming software is for computer programmers and developers who are writing code. These are programs that are used to write, develop, test, and debug other software programs. It's helpful to think of these programs as a translator of sorts: they take programming languages like Laravel, Python, C++, and more and translate them into something a computer or phone will understand.

Driver Software: This software is often considered to be a type of system software. Driver software operates and controls devices that are plugged into a computer. These drivers make it possible for devices to perform their necessary functions

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Computing Skills

B. Voc. Program, 1st Semester (2022)

End -Sem. Examination

Course Code: ITN1104 **Time: 2 Hour**

Course Name: Basics of Networking **Max. Marks: 50**

Instruction: Attempt all questions

Section-A

10X01 = 10 Mark

Q.1 TCP/IP is .

(A)Network hardware (C) Protocol

(B)Network software (D) PAN

Q.2 What is The Full Form of MAC address:

(A) Media Access Control (C) Metropolitan Access Control

(B) Metro Access Control (D)Both A & B

Q.3 What kind of transmission medium is most appropriate to carry data in a computer network that is exposed to electrical interference's?

(a) Unshielded twisted pair (C) Optical fiber

(b) Coaxial cable (D) Microwave

Q.4 Which one of the following is not a network topology?

a) Star (b) Bus (c) Peer to Peer (d) Ring

Q.5 Several computers linked to a server to share programs and storage space:

(A)Library (C) Network

(B)Grouping (D) Integrated system

Q.6 Identify the class of the following IP address: 6.7.8.9.

A) class A

B) class B

C) class C

D) none of the above

Q.7 The number of addresses in a class B block is _____.

A) 65,534

B) 16,777,216

C) 256

D) none of the above

Q.8 The number of addresses in a class A block is _____.

A) 65,534

B) 16,777,216

C) 256

D) none of the above

Q.9 The number of addresses in a class C block is _____.

A) 65,534

B) 16,777,216

C) 256

D) none of the above

Q.10 Identify the class of the following IP address: 221.10.20.30.

A) class A

B) class B

C) class D

D) none of the above

Section - B

04X04 = 16 Marks

Q.1Explain Network.

Q.2 Explain Subnetting with example .

Q.3 Explain super netting with example

Q.4 Explain network ID , Host ID , Network range and Broadcast ID .

Section - C

04X06 =24 Marks

Q.1 Explain Seven layer of OSI Model.

Q.2 Explain different types of network topology .

Q.3 Explain IPV4 and IPV6

Q.4 Explain IP classes .

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Computing Skills

B. Voc. Program, 1st Semester (2022)

End In-Sem. Examination

Course Code: ITN1104 **Time: 2 Hour**

Course Name: Basics of Networking **Max. Marks: 50**

Instruction: Attempt all questions

ANSWER SHEET

Section-A

Q.1 C

Q.2 A

Q.3C

Q.4 B

Q.5 C

Q.6A

Q.7 A

Q.8 16777216

Q.9 256

Q10D

SECTION B

Answer 1 : network computer is **an inexpensive personal computer designed for a centrally-managed network** -- that is, data are stored and updated on a network server -- and lacks a disk drive, CD-ROM drive or expansion slots. A network computer depends on network servers for processing power and data storage.

Answer 2 : When a bigger network is divided into smaller networks, to maintain security, then that is known as Subnetting. So, maintenance is easier for smaller networks. **Now, let's talk about dividing a network into two parts:** To divide a network into two parts, you need to choose one bit for each Subnet from the host ID part.

An organization is assigned a class C network address of 201.35.2.0. It uses a netmask of 255.255.255.192 to divide this into sub-networks. Which of the following is/are valid host IP addresses?

A. 201.35.2.129
B. 201.35.2.191
C. 201.35.2.255
D. Both (A) and (C)

Solution:

Converting the last octet of the netmask into the binary form: 255.255.255.**11**000000

Converting the last octet of option A into the binary form: 201.35.2.**10**000001

Converting the last octet of option B into the binary form: 201.35.2.**10**111111

Converting the last octet of option C into the binary form: 201.35.2.**11**111111

From the above, we see that Option B and C is not a valid host IP address (as they are broadcast address of a subnetwork)

and OPTION A is not a broadcast address and it can be assigned to a host IP.

Answer 3 : **Supernetting** is the opposite of Subnetting. In subnetting, a single big network is divided into multiple smaller subnetworks. In Supernetting, multiple networks are combined into a bigger network termed as a Supernetwork or Supernet.

Supernetting is mainly used in Route Summarization, where routes to multiple networks with similar network prefixes are combined into a single routing entry, with the routing entry pointing to a Super network, encompassing all the networks. This in turn significantly reduces the size of routing tables and also the size of routing updates exchanged by routing protocols.

Suppose 4 small networks of class C:

200.1.0.0,
200.1.1.0,
200.1.2.0,
200.1.3.0

Build a bigger network that has a single Network Id.

Explanation – Before Supernetting routing table will look like as:

Network Id Subnet Mask Interface

Network Id	Subnet Mask	Interface
200.1.0.0	255.255.255.0	A
200.1.1.0	255.255.255.0	B
200.1.2.0	255.255.255.0	C
200.1.3.0	255.255.255.0	D

First, let's check whether three conditions are satisfied or not:

1. **Contiguous:** You can easily see that all networks are contiguous all having size 256 hosts.
   Range of first Network from 200.1.0.0 to 200.1.0.255. If you add 1 in last IP address of first network that is 200.1.0.255 + 0.0.0.1, you will get the next network id which is 200.1.1.0. Similarly, check that all network are contiguous.

2. **Equal size of all network:** As all networks are of class C, so all of them have a size of 256 which is in turn equal to 2^8.

3. **First IP address exactly divisible by total size:** When a binary number is divided by 2^n then last n bits are the remainder. Hence in order to prove that first IP address is exactly divisible by while size of Supernet Network. You can check that if last n v=bits are 0 or not.

   In the given example first IP is 200.1.0.0 and whole size of supernet is $4*2^8 = 2^{10}$. If last 10 bits of first IP address are zero then IP will be divisible.

Answer 4 :

Network ID:

A network ID or NetID is the fragment of IP address that classifies the network for a specified host i.e., it tells us which network the host belongs to, generally comprised of one to up to four octets in dotted-decimal representation.

In dotted-decimal representation, an IP address is divided into four octets, and based on which class the IP address belongs to its octets are further divided into network ID and HOST ID.

Host ID:

It is the fragment of an IP address that uniquely classifies a host on a specified TCP/IP network. A host ID can be found simply by ANDing the IP address in binary form with its respective default subnet mask (in binary form). The other fragment of an IP address is the network ID, which identifies the network to which the host belongs.

Broadcast ID

This is usually the last address in a network address range

Section C

Answer 1:

7. Application Layer

The application layer is used by end-user software such as web browsers and email clients. It provides protocols that allow software to send and receive information and present meaningful data to users. A few examples of application layer protocols are the Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP), and Domain Name System (DNS).

6. Presentation Layer

The presentation layer prepares data for the application layer. It defines how two devices should encode, encrypt, and compress data so it is received correctly on the other end. The presentation layer takes any data transmitted by the application layer and prepares it for transmission over the session layer.

5. Session Layer

The session layer creates communication channels, called sessions, between devices. It is responsible for opening sessions, ensuring they remain open and functional while data is being transferred, and closing them when communication ends. The session layer can also set checkpoints during a data transfer—if the session is interrupted, devices can resume data transfer from the last checkpoint.

4. Transport Layer

The transport layer takes data transferred in the session layer and breaks it into "segments" on the transmitting end. It is responsible for reassembling the segments on the receiving end, turning it back into data that can be used by the session layer. The transport layer carries out flow control, sending data at a rate that matches the connection speed of the receiving device, and error control, checking if data was received incorrectly and if not, requesting it again.

3. Network Layer

The network layer has two main functions. One is breaking up segments into network packets, and reassembling the packets on the receiving end. The other is routing packets by discovering the best path across a physical network. The network layer uses network addresses (typically Internet Protocol addresses) to route packets to a destination node.

2. Data Link Layer

The data link layer establishes and terminates a connection between two physically-connected nodes on a network. It breaks up packets into frames and sends them from source

to destination. This layer is composed of two parts—Logical Link Control (LLC), which identifies network protocols, performs error checking and synchronizes frames, and Media Access Control (MAC) which uses MAC addresses to connect devices and define permissions to transmit and receive data.

1. Physical Layer

The physical layer is responsible for the physical cable or wireless connection between network nodes. It defines the connector, the electrical cable or wireless technology connecting the devices, and is responsible for transmission of the raw data, which is simply a series of 0s and 1s, while taking care of bit rate control.

Answer 2 : Mesh Topology:

In a mesh topology, every device is connected to another device via a particular channel. In Mesh Topology, the protocols used are AHCP (Ad Hoc Configuration Protocols), DHCP (Dynamic Host Configuration Protocol), etc.

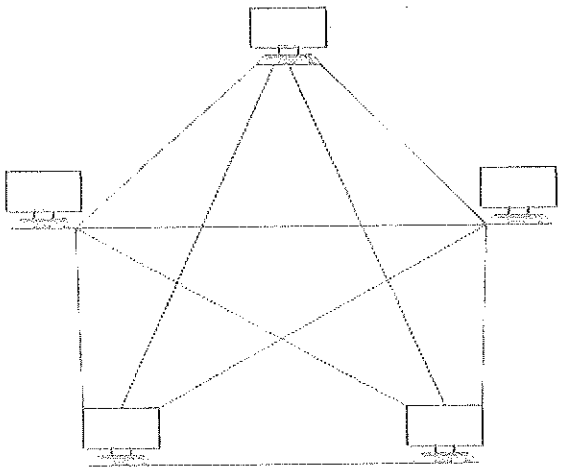


Figure 1: Every device is connected with another via dedicated channels. These channels are known as links.

- Suppose, the N number of devices are connected with each other in a mesh topology, the total number of ports that are required by each device is N-1. In Figure 1, there are 5 devices connected to each other, hence the total number of ports required by each device is 4. Total number of ports required=N*(N-1).
- Suppose, N number of devices are connected with each other in a mesh topology, then the total number of dedicated links required to connect them is ${}^{N}C_{2}$ i.e. N(N-1)/2. In Figure 1, there are 5 devices connected to each other, hence the total number of links required is 5*4/2 = 10.

Advantages of this topology:

- It is robust.
- The fault is diagnosed easily. Data is reliable because data is transferred among the devices through dedicated channels or links.
- Provides security and privacy.

Problems with this topology:

- Installation and configuration are difficult.
- The cost of cables is high as bulk wiring is required, hence suitable for less number of devices.
- The cost of maintenance is high.

Star Topology:

In star topology, all the devices are connected to a single hub through a cable. This hub is the central node and all other nodes are connected to the central node. The hub can be passive in nature i.e., not an intelligent hub such as broadcasting devices, at the same time the hub can be intelligent known as an active hub. Active hubs have repeaters in them. In Star Topology, many popular Ethernet LAN protocols are used as CD(Collision Detection), CSMA (Carrier Sense Multiple Access), etc.

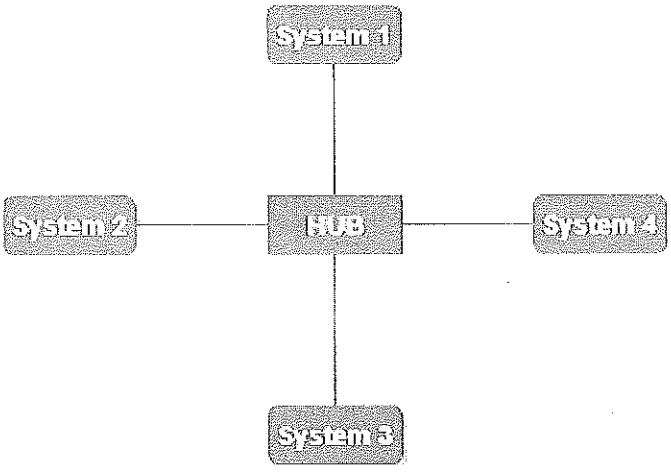


Figure 2: A star topology having four systems connected to a single point of connection i.e. hub.

Advantages of this topology:

- If N devices are connected to each other in a star topology, then the number of cables required to connect them is N. So, it is easy to set up.
- Each device requires only 1 port i.e. to connect to the hub, therefore the total number of ports required is N.

Problems with this topology:

- If the concentrator (hub) on which the whole topology relies fails, the whole system will crash down.
- The cost of installation is high.
- Performance is based on the single concentrator i.e. hub.

Bus Topology:

Bus topology is a network type in which every computer and network device is connected to a single cable. It transmits the data from one end to another in a single direction. No bi-directional feature is in bus topology. It is a multi-point connection and a non-robust topology because if the backbone fails the topology crashes. In Bus Topology, various MAC (Media Access Control) protocols are followed by LAN ethernet connections like TDMA, Pure Aloha, CDMA, Slotted Aloha, etc.

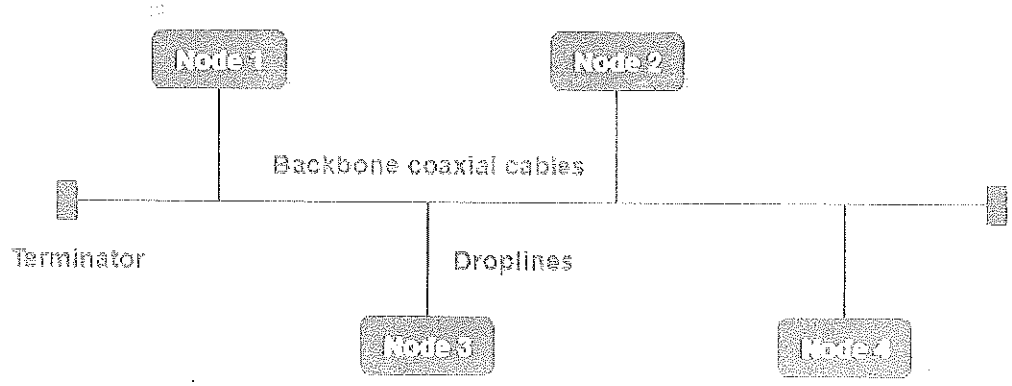


Figure 3: A bus topology with shared backbone cable. The nodes are connected to the channel via drop lines.

Advantages of this topology:

- If N devices are connected to each other in a bus topology, then the number of cables required to connect them is 1, which is known as backbone cable, and N drop lines are required.
- The cost of the cable is less compared to other topologies, but it is used to build small networks.

Problems with this topology:

- If the common cable fails, then the whole system will crash down.
- If the network traffic is heavy, it increases collisions in the network. To avoid this, various protocols are used in the MAC layer known as Pure Aloha, Slotted Aloha, CSMA/CD, etc.
- Security is very low.

Ring Topology:

In this topology, it forms a ring connecting devices with exactly two neighboring devices.

A number of repeaters are used for Ring topology with a large number of nodes, because if someone wants to send some data to the last node in the ring topology with 100 nodes, then the data will have to pass through 99 nodes to reach the 100th node. Hence to prevent data loss repeaters are used in the network.

The transmission is unidirectional, but it can be made bidirectional by having 2 connections between each Network Node, it is called Dual Ring Topology. In-Ring Topology, the Token Ring Passing protocol is used by the workstations to transmit the data.

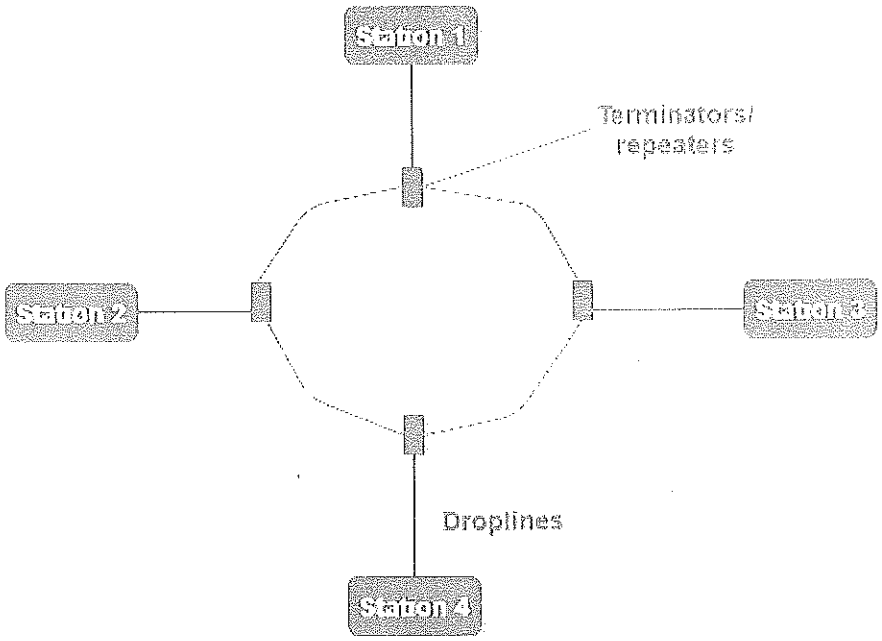


Figure 4: A ring topology comprises 4 stations connected with each forming a ring.

The following operations take place in ring topology are :

1. One station is known as a **monitor** station which takes all the responsibility to perform the operations.
2. To transmit the data, the station has to hold the token. After the transmission is done, the token is to be released for other stations to use.
3. When no station is transmitting the data, then the token will circulate in the ring.
4. There are two types of token release techniques: **Early token release** releases the token just after transmitting the data and **Delay token release** releases the token after the acknowledgment is received from the receiver.

Advantages of this topology:

- The possibility of collision is minimum in this type of topology.
- Cheap to install and expand.

Problems with this topology:

- Troubleshooting is difficult in this topology.
- The addition of stations in between or removal of stations can disturb the whole topology.
- Less secure.

Tree Topology :

This topology is the variation of the Star topology. This topology has a hierarchical flow of data. In Tree Topology, SAC (Standard Automatic Configuration) protocols like DHCP and SAC are used.

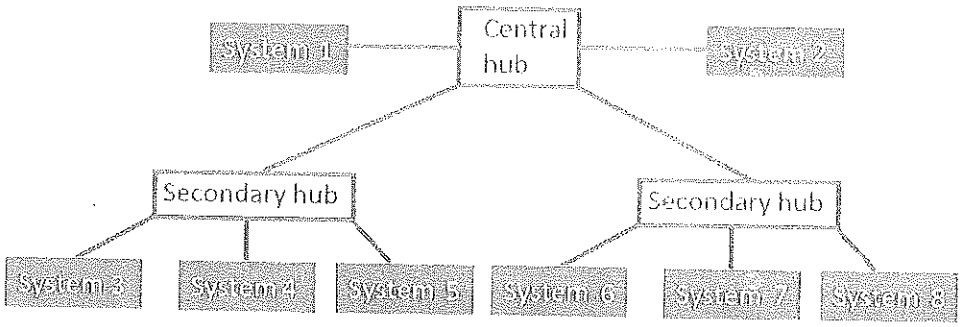


Figure 5: In this, the various secondary hubs are connected to the central hub which contains the repeater. This data flow from top to bottom i.e. from the central hub to the secondary and then to the devices or from bottom to top i.e. devices to the secondary hub and then to the central hub. It is a multi-point connection and a non-robust topology because if the backbone fails the topology crashes.

Advantages of this topology :

- It allows more devices to be attached to a single central hub thus it decreases the distance that is traveled by the signal to come to the devices.
- It allows the network to get isolated and also prioritize from different computers.

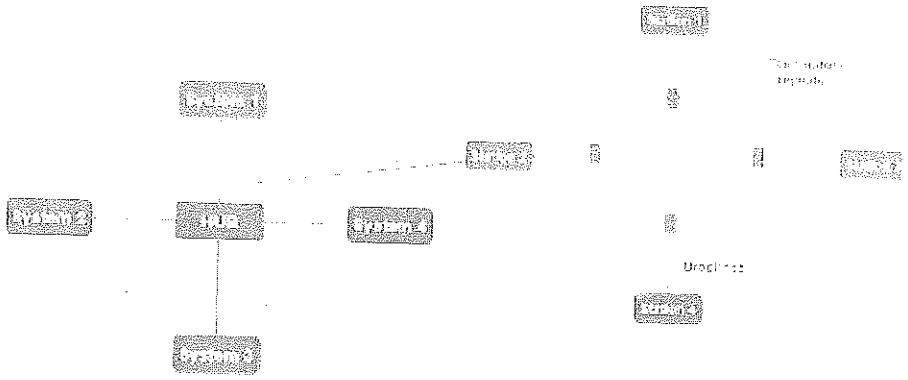
Problems with this topology :

- If the central hub gets fails the entire system fails.

- The cost is high because of cabling.

Hybrid Topology :

This topology technology is the combination of all the various types of topologies we have studied above. It is used when the nodes are free to take any form. It means these can be individuals such as Ring or Star topology or can be a combination of various types of topologies seen above. Each individual topology uses the protocol that has been discussed earlier.



Answer 3 :

IPv4	IPv6
IPv4 has a 32-bit address length	IPv6 has a 128-bit address length
It Supports Manual and DHCP address configuration	It supports Auto and renumbering address configuration
In IPv4 end to end, connection integrity is Unachievable	In IPv6 end to end, connection integrity is Achievable

Answer 4 :

Class	*IP address range (1st Octet)*	*Network Mask*	*Prefix*	*Number of Networks*	*Number of Hosts*
A	1. - 127.	255.0.0.0	/8	125	16,777,214
B	128. - 191.	255.255.0.0	/16	16,382	65,534
C	192. - 223.	255.255.255.0	/24	2,097,150	254
D	224. - 239.	Multicast addresses			
E	240. - 254.	Restricted/Experimental			

B

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Computing Skills

B. Voc. Program, 1st Semester (2022)

End -Sem. Examination

Course Code: ITN1104 **Time: 2 Hour**

Course Name: Basics of Networking **Max. Marks: 50**

Instruction: Attempt all questions

Section-A

10X01 = 10 Mark

Q.1 Which network is suitable for a BSDU.

(A)LAN (C) WAN

(B)MAN (D) PAN

Q.2 What is The Full Form of OSI:

(A) Open source interference (C) open system inter

(B) Open system interconnection (D)Both A & C

Q.3 The network topology is categorized into _____ types.

a) One
b) Two
c) Three
d) Four

Q.4 In which topology do all the computers connect with the help of a hub.

a) Star
b) Bus
c) Ring
d) Mesh

Q.5 In which topology the network consists direct link between two computers.

a) Star
b) Bus
c) Ring
d) P2P

Q.6 Which layer transmits the frames into transmission media.

a) Data link
b) Physical
c) Network

d) None of the above

Q.7 In a bus topology, the computers connect to a shared central cable called as _____

a) Bus
b) Star
c) Ring
d) None of the above

Q.8 _____ is the example for mesh topology.

a) Ethernet LAN's
b) High-speed LANs
c) Connection between regional telephone offices
d) All of the above

Q.9 The distance range of the Local Area Network is around _____

a) 1Km
b) 2Km
c) 0.1Km to 1Km
d) 5Km

Q.10The distance range of the Wide Area Network is around _____

a) 10 to 100Km
b) 100 to 1000Km
c) 0.1Km to 1Km
d) 1 to 10Km

Section - B

04X04 = 16 Marks

Q.1 Explain Network topology with diagram .

Q.2 Difference between subnetting and super netting.

Q.3 What is IP address .

Q.4 Explain MAC address.

Section - C

04X06 =24 Marks

Q.1 Explain TCP/IP model .

Q.2 How are IP address distributed.

Q.3 Explain type of internet cables.

Q.4 Explain Class A, Class B, Class C, Class D and Class E of internet .

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Computing Skills

B. Voc. Program, 1st Semester (2022)

End In-Sem. Examination

Course Code: ITN1104 | **Time: 2 Hour**

Course Name: Basics of Networking | **Max. Marks: 50**

Instruction: Attempt all questions

ANSWER SHEET

Section-A

Section A:

Q.1A

Q.2A

Q.3D

Q.4A

Q.5B

Q.6C

Q.7B

Q.8C

Q.9A

Q.10B

SECTION B

Answer 1 : Mesh Topology:

In a mesh topology, every device is connected to another device via a particular channel. In Mesh Topology, the protocols used are AHCP (Ad Hoc Configuration Protocols), DHCP (Dynamic Host Configuration Protocol), etc.

- Suppose, the N number of devices are connected with each other in a mesh topology, the total number of ports that are required by each device is N-1. In Figure 1, there are 5 devices connected to each other, hence the total number of ports required by each device is 4. Total number of ports required=N*(N-1).
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Advantages of this topology:

- It is robust.
- The fault is diagnosed easily. Data is reliable because data is transferred among the devices through dedicated channels or links.
- Provides security and privacy.

Problems with this topology:

- Installation and configuration are difficult.
- The cost of cables is high as bulk wiring is required, hence suitable for less number of devices.
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Star Topology:

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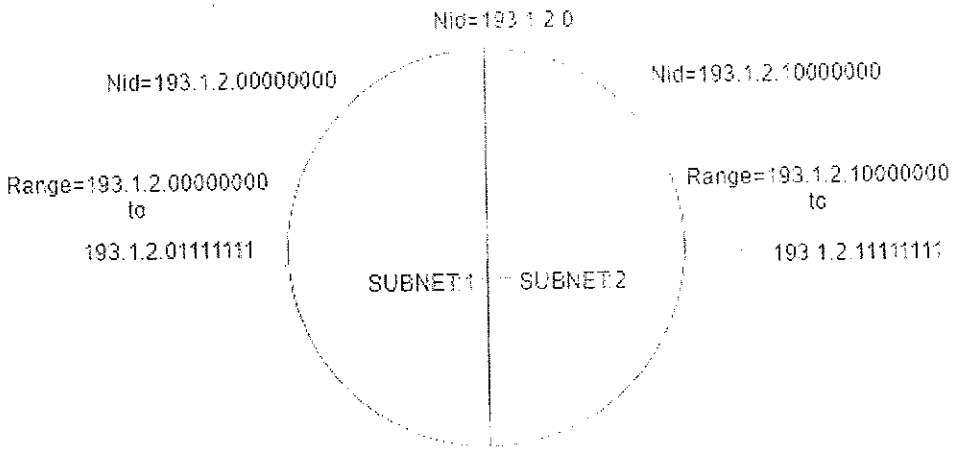
This topology technology is the combination of all the various types of topologies we have studied above. It is used when the nodes are free to take any form. It means these can be individuals such as Ring or Star topology or can be a combination of various types of topologies seen above. Each individual topology uses the protocol that has been discussed earlier.

Answer 2 : When a bigger network is divided into smaller networks, to maintain security, then that is known as Subnetting. So, maintenance is easier for smaller networks. **Now, let's talk about dividing a network into two parts:** To divide a network into two parts, you need to choose one bit for each Subnet from the host ID part.



In the above diagram, there are two Subnets. **Note:** It is a class C IP so, there are 24 bits in the network id part and 8 bits in the host id part.

- **For Subnet-1:** The first bit which is chosen from the host id part is zero and the range will be from (193.1.2.00000000 till you get all 1's in the host ID part i.e, 193.1.2.01111111) except for the first bit which is chosen zero for subnet id part. Thus, the range of subnet-1:

```
193.1.2.0 to 193.1.2.127
```

- **For Subnet-2:** The first bit chosen from the host id part is one and the range will be from (193.1.2.100000000 till you get all 1's in the host ID part i.e, 193.1.2.11111111). Thus, the range of subnet-2:

```
193.1.2.128 to 193.1.2.255
```

Note:

1. To divide a network into four (2^2) parts you need to choose two bits from the host id part for each subnet i.e, (00, 01, 10, 11).
2. To divide a network into eight (2^3) parts you need to choose three bits from the host id part for each subnet i.e, (000, 001, 010, 011, 100, 101, 110, 111) and so on.

Supernetting is the opposite of Subnetting. In subnetting, a single big network is divided into multiple smaller subnetworks. In Supernetting, multiple networks are combined into a bigger network termed as a Supernetwork or Supernet.

Supernetting is mainly used in Route Summarization, where routes to multiple networks with similar network prefixes are combined into a single routing entry, with the routing entry pointing to a Super network, encompassing all the networks. This in turn significantly reduces the size of routing tables and also the size of routing updates exchanged by routing protocols.

More specifically,

- When multiple networks are combined to form a bigger network, it is termed super-netting
- Super netting is used in route aggregation to reduce the size of routing tables and routing table updates

There are some points which should be kept in mind while supernetting:

1. All the Networks should be contiguous.
2. The block size of every network should be equal and must be in form of 2^n.
3. First Network id should be exactly divisible by whole size of supernet.

Example – Suppose 4 small networks of class C:

```
200.1.0.0,
200.1.1.0,
200.1.2.0,
200.1.3.0
```

Build a bigger network that has a single Network Id.

Explanation – Before Supernetting routing table will look like as:

Network Id	Subnet Mask	Interface
200.1.0.0	255.255.255.0	A
200.1.1.0	255.255.255.0	B
200.1.2.0	255.255.255.0	C
200.1.3.0	255.255.255.0	D

First, let's check whether three conditions are satisfied or not:

1. **Contiguous:** You can easily see that all networks are contiguous all having size 256 hosts.
   Range of first Network from 200.1.0.0 to 200.1.0.255. If you add 1 in last IP address of first network that is 200.1.0.255 + 0.0.0.1, you will get the next network id which is 200.1.1.0. Similarly, check that all network are contiguous.

2. **Equal size of all network:** As all networks are of class C, so all of them have a size of 256 which is in turn equal to 2^8.

3. **First IP address exactly divisible by total size:** When a binary number is divided by 2^n then last n bits are the remainder. Hence in order to prove that first IP address is exactly divisible by while size of Supernet Network. You can check that if last n v=bits are 0 or not.

   In the given example first IP is 200.1.0.0 and whole size of supernet is $4*2^8 = 2^{10}$. If last 10 bits of first IP address are zero then IP will be divisible.

Answer 3: An IP address is a unique address that identifies a device on the internet or a local network. IP stands for "Internet Protocol," which is the set of rules governing the format of data sent via the internet or local network.

Every individual or business with an internet service plan ~~will~~ have two types of IP addresses: their private IP addresses and their public IP address. The terms public and private relate to the network location — that is, a private IP address is used inside a network, while a public one is used outside a network.

Private IP addresses

Every device that connects to your internet network has a private IP address. This includes computers, smartphones, and tablets but also any Bluetooth-enabled devices like speakers, printers, or smart TVs. With the growing internet of things, the number of private IP addresses you have at home is probably growing. Your router needs a way to identify these items separately, and many items need a way to recognize each other. Therefore, your router generates private IP addresses that are unique identifiers for each device that differentiate them on the network.

Public IP addresses

A public IP address is the primary address associated with your whole network. While each connected device has its own IP address, they are also included within the main IP address for your network. As described above, your public IP address is provided to your router by your ISP. Typically, ISPs have a large pool of IP addresses that they distribute to their customers. Your public IP address is the address that all the devices outside your internet network will use to recognize your network.

Public IP addresses

Public IP addresses come in two forms – dynamic and static.

Dynamic IP addresses

Dynamic IP addresses change automatically and regularly. ISPs buy a large pool of IP addresses and assign them automatically to their customers. Periodically, they re-assign them and put the older IP addresses back into the pool to be used for other customers. The rationale

for this approach is to generate cost savings for the ISP. Automating the regular movement of IP addresses means they don't have to carry out specific actions to re-establish a customer's IP address if they move home, for example. There are security benefits, too, because a changing IP address makes it harder for criminals to hack into your network interface.

Static IP addresses

In contrast to dynamic IP addresses, static addresses remain consistent. Once the network assigns an IP address, it remains the same. Most individuals and businesses do not need a static IP address, but for businesses that plan to host their own server, it is crucial to have one. This is because a static IP address ensures that websites and email addresses tied to it will have a consistent IP address — vital if you want other devices to be able to find them consistently on the web.

This leads to the next point – which is the two types of website IP addresses.

- Answer 4: MAC address is the physical address, which uniquely identifies each device on a given network. To make communication between two networked devices, we need two addresses: **IP address and MAC address.** It is assigned to the NIC (Network Interface card) of each device that can be connected to the internet.
- It stands for **Media Access Control**, and also known as **Physical address, hardware address, or BIA (Burned In Address).**
- It is globally unique; it means two devices cannot have the same MAC address. It is represented in a hexadecimal format on each device, such as **00:0a:95:9d:67:16.**
- It is 12-digit, and 48 bits long, out of which the first *24 bits are used for* ***OUI****(Organization Unique Identifier),* and *24 bits are for NIC/vendor-specific.*
- It works on the data link layer of the OSI model.
- It is provided by the device's vendor at the time of manufacturing and embedded in its NIC, which is ideally cannot be changed.
- The **ARP protocol** is used to associate a logical address with a physical or MAC address.

Section C

Answer 1 : It stands for Transmission Control Protocol/Internet Protocol. The **TCP/IP model** is a concise version of the OSI model. It contains four layers, unlike seven layers in the OSI model. The layers are:

1. Process/Application Layer
2. Host-to-Host/Transport Layer
3. Internet Layer
4. Network Access/Link Layer

The diagrammatic comparison of the TCP/IP and OSI model is as follows :

TCP refers to Transmission Control Protocol.

- TCP/IP has 4 layers.

- TCP/IP is more reliable
- TCP/IP does not have very strict boundaries.
- TCP/IP follow a horizontal approach.
- TCP/IP uses both session and presentation layer in the application layer itself.
- TCP/IP developed protocols then model.
- Transport layer in TCP/IP does not provide assurance delivery of packets.
- TCP/IP model network layer only provides connection less services.
- Protocols cannot be replaced easily in TCP/IP model.

Answer 2 : IP addresses are distributed **in a hierarchical system**. As the operator of Internet Assigned Numbers Authority (IANA) functions, ICANN allocates IP address blocks to the five Regional Internet Registries (RIRs) around the world. (The "regions" of the Regional Internet Registries are roughly continental in size.

Answer 3 : o connect two or more computers or networking devices in a network, network cables are used. There are three types of network cables; coaxial, twisted-pair, and fiber-optic.

Coaxial cable

This cable contains a conductor, insulator, braiding, and sheath. The sheath covers the braiding, the braiding covers the insulation, and the insulation covers the conductor.

The following image shows these components.

coaxial cable

Sheath

This is the outer layer of the coaxial cable. It protects the cable from physical damage.

Braided shield

This shield protects signals from external interference and noise. This shield is built from the same metal that is used to build the core.

Insulation

Insulation protects the core. It also keeps the core separate from the braided shield. Since both the core and the braided shield use the same metal, without this layer, they will touch each other and create a short-circuit in the wire.

Conductor

The conductor carries electromagnetic signals. Based on conductor a coaxial cable can be categorized into two types; single-core coaxial cable and multi-core coaxial cable.

A single-core coaxial cable uses a single central metal (usually copper) conductor, while a multi-core coaxial cable uses multiple thin strands of metal wires. The following image shows both types of cable.

single core and multi-core coaxial cable

Coaxial cables in computer networks

The coaxial cables were not primarily developed for the computer network. These cables were developed for general purposes. They were in use even before computer networks came into existence. They are still used even their use in computer networks has been completely discontinued.

At the beginning of computer networking, when there were no dedicated media cables available for computer networks, network administrators began using coaxial cables to build computer networks.

Because of its low cost and long durability, coaxial cables were used in computer networking for nearly two decades (the 80s and 90s). Coaxial cables are no longer used to build any type of computer network.

Specifications of coaxial cables

Coaxial cables have been in use for the last four decades. During these years, based on several factors such as the thickness of the sheath, the metal of the conductor, and the material used in insulation, hundreds of specifications have been created to specify the characteristics of coaxial cables.

From these specifications, only a few were used in computer networks. The following table lists them.

Coaxial cable uses RG rating to measure the materials used in shielding and conducting cores.

RG stands for the Radio Guide. Coaxial cable mainly uses radio frequencies in transmission.

Impedance is the resistance that controls the signals. It is expressed in the ohms.

AWG stands for American Wire Gauge. It is used to measure the size of the core. The larger the AWG size, the smaller the diameter of the core wire.

Twisted-pair cables

The twisted-pair cable was primarily developed for computer networks. This cable is also known as Ethernet cable. Almost all modern LAN computer networks use this cable.

This cable consists of color-coded pairs of insulated copper wires. Every two wires are twisted around each other to form pair. Usually, there are four pairs. Each pair has one solid color and one

stripped color wire. Solid colors are blue, brown, green, and orange. In stripped color, the solid color is mixed with the white color.

Based on how pairs are stripped in the plastic sheath, there are two types of twisted-pair cable; UTP and STP.

In the UTP (Unshielded twisted-pair) cable, all pairs are wrapped in a single plastic sheath.

In the STP (Shielded twisted-pair) cable, each pair is wrapped with an additional metal shield, then all pairs are wrapped in a single outer plastic sheath.

Similarities and differences between STP and UTP cables

Both STP and UTP can transmit data at 10Mbps, 100Mbps, 1Gbps, and 10Gbps.

Since the STP cable contains more materials, it is more expensive than the UTP cable.

Both cables use the same RJ-45 (registered jack) modular connectors.

Both cables can accommodate a maximum of 1024 nodes in each segment.

The STP provides more noise and EMI resistance than the UTP cable.

The maximum segment length for both cables is 100 meters or 328 feet.

STP UTP cable

To learn how twisted-pair cables are used in the LAN network, you can check the following tutorial.

Twisted-pair cabling

This tutorial explains how the twisted-pair cable works and how it is used to connect different networking devices in a network.

The TIA/EIA specifies standards for the twisted-pair cable. The first standards were released in 1991, known as TIA/EIA 568. Since then, these standards have been continually revised to cover the latest technologies and developments of the transmission media.

The TIA/EIA 568 divides the twisted-pair cable into several categories. The following table lists the most common and popular categories of twisted-pair cable.

Fiber optic cable

This cable consists of a core, cladding, buffer, and jacket. The core is made from thin strands of glass or plastic that can carry data over a long distance. The core is wrapped in the cladding; the cladding is wrapped in the buffer, and the buffer is wrapped in the jacket.

Core carries the data signals in the form of light.

Cladding reflects light back to the core.

Buffer protects the light from leaking.

The jacket protects the cable from physical damage.

Fiber optic cable is completely immune to EMI and RFI. This cable can transmit data over a long distance at the highest speed. It can transmit data up to 40 kilometers at the speed of 100Gbps.

Fiber optic uses light to send data. It reflects light from one endpoint to another. Based on how many beams of light are transmitted at a given time, there are two types of fiber optical cable; SMF and MMF.

SMF MMF Fiber optical cable

SMF (Single-mode fiber) optical cable

This cable carries only a single beam of light. This is more reliable and supports much higher bandwidth and longer distances than the MMF cable. This cable uses a laser as the light source and transmits 1300 or 1550 nano-meter wavelengths of light.

MMF (multi-mode fiber) optical cable

This cable carries multiple beams of light. Because of multiple beams, this cable carries much more data than the SMF cable. This cable is used for shorter distances. This cable uses an LED as the light source and transmits 850 or 1300 nano-meter wavelengths of light.

Answer 4 :

Class	*IP address range (1st Octet)*	*Network Mask*	*Prefix*	*Number of Networks*	*Number of Hosts*
A	1. - 127.	255.0.0.0	/8	125	16,777,214
B	128. - 191.	255.255.0.0	/16	16,382	65,534
C	192. - 223.	255.255.255.0	/24	2,097,150	254
D	224. - 239.	Multicast addresses			
E	240. - 254.	Restricted/Experimental			