SET-C
Answer all the Questions
(2 x 25 = 50 Marks)

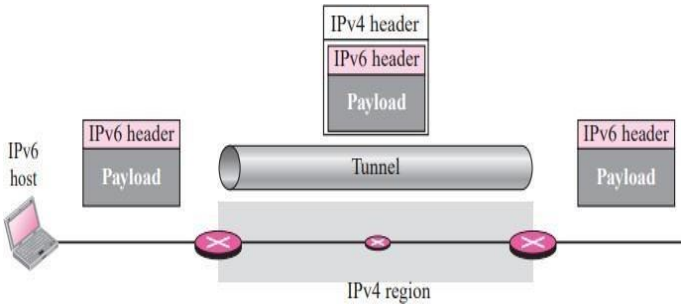
Instructions: Answer the questions

Ql. No	Question	Marks
1	i) Match the IPV6 addresses to their corresponding address type.Note that the addresses have been compressed to theirabbreviated notation, and the slash network prefix is not shown. Some choices can be used more than once. a. Loopback address b. Link-local address c. Unique local address d. Global unicast address e. Multicast address	10

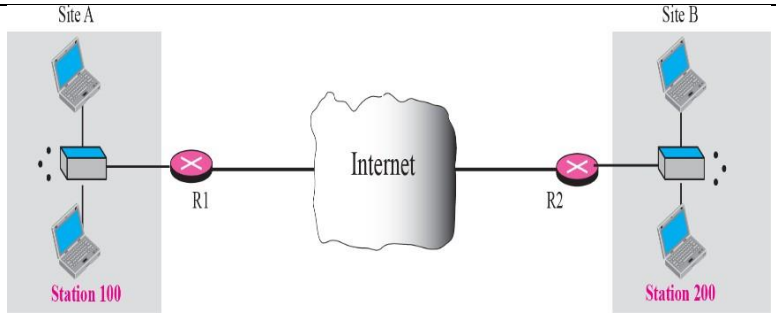
IPV6 Address	Answer
2001:0db8:1:acad::fe55:6789:b210	**d**
::1	**a**
fc00:22:a:2::cd4:23e4:76fa	**c**
2033:db8:1:1:22:a33d:259a:21fe	**d**
fe80::3201:cc01:65b1	**b**
ff00::	**e**
ff00::db7:4322:a231:67c	**e**
ff02::2	**e**

	ii) Show abbreviations for the following addresses. a. 0000:FFFF:FFFF:0000:0000:0000:0000:0000 b. 1234:2346:3456:0000:0000:0000:0000:FFFF c. 0000:0001:0000:0000:0000:FFFF:1200:1000 d. 0000:0000:0000:0000:FFFF:FFFF:24.123.12.6 **a. 0:FFFF:FFFF::** **b. 1234:2346:3456::FFFF** **c. 0:1::FFFF:1200:1000** d. **d. ::FFFF:FFFF:24.123.12.6**	5

	iii) a. Find the interface identifier if the physical address of theEUI is (F5-A9-23-AA07-14-7A-23)16 using the format we defined for Ethernet addresses. **Map the EUI to interface identifier by inverting the seventh bit of the first octet. The first octet value** **F5 -> (11110101)** **F7 -> (11110111)** **Interface identifier: F7- A9-23-AA-07-14-7A-23** **F7A9:23AA:0714:7A23** b. An organization is assigned the block 2000:1234:1423/48. What is the CIDR notation for the blocks in the first and second subnets in this organization? **The first and second subnets should use the block with subnet identifiers 0001_{16} and 0002_{16}. This means that the blocks are** **2000:1234:1423:0000/64** **and** **2000:1234:1423:0001/64.**	5 5
	(OR)	
2.	i) Alice and Bob want to communicate with each other. Both are using IPV6 systems for communication. But the packet they sendmust pass through the region that uses IPV4. What strategies doAlice and Bob have to use in order to have seamless communication with each other? Justify and explain the strategyin detail. **Tunneling** • **Tunneling is a strategy used when two computers using IPv6 want to communicate with each other, andthe packet must pass through a region that uses IPv4.** • **To pass through this region, the packet must have anIPv4 address.** • **The IPv6 packet is encapsulated in an IPv4 packet when it enters the region, and it leaves its capsule when it exits the region.** • **It seems as if the IPv6 packet goes through a tunnel at one end and**	**10**

	• **emerges at the other end.** • **To make it clear that the IPv4 packet is carrying anIPv6 packet as data, the protocol value is set to 41.**  	
	ii) a Decompress the following addresses and show the complete unabbreviated IPv6 address. a. ::2222 b. 1111:: c. 0:1:2:: d. B:A:CC::1234:A **a. 0000:0000:0000:0000:0000:0000:0000:2222** **b. 1111:0000:0000:0000:0000:0000:0000:0000** **c. 0000:0001:0002:0000:0000:0000:0000:0000** **d. 000B:000A:00CC:0000:0000:0000:1234:000A** b. Show the unabbreviated colon hex notation for the following IPv6 addresses. a. An address with 64 0s followed by 64 1s. b. An address with 128 0s. c. An address with 128 1s. d. An address with 128 alternative 1s and 0s. **a. 0000:0000:0000:0000:FFFF:FFFF:FFFF:FFFF** **b. 0000:0000:0000:0000:0000:0000:0000:0000** **c. FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF** **d. AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA**	5 5
	ii) Find the interface identifier if the Ethernet physical address is (F5-A9-23-12-7AB2)16 using the format we defined for Ethernet addresses. **To map the Ethernet address to the interface identifier, we need to invert the seventh bit of the first octet, and FFFE has to be inserted after the 3 octet.** **F5 -> (11110101)**	5

	F7 -> (11110111) **F7-A9-23-FF-FE-12-7A-B2** **Colon hex notation - F7A9:23FF:FE12:7AB2**	
3 .	(i) Consider the scenario that you are the network administrator in your organization. The organization hasseveral users at different branches. All the servers and client machines are installed with the Windows operating system. The head office is in Johannesburg. The building of the new branch office in Durban has been completed and requires the installation of a network. Justify the secure communication technology used for connecting Johannesburg and Durban offices. **VPN** ◦ **VPN is a network that is private but virtual.** ◦ **It is private because it guarantees privacy insidethe organization.** ◦ **It is virtual because it does not use real private WANs; the network is physically public but virtually private.** ◦ **Routers R1 and R2 use VPN technology to guarantee privacy for the organization.** ◦ **VPN technology uses ESP protocol of IPSec in the tunnel mode. A private datagram, including the header, is encapsulated in an ESP packet.** ◦ **The router at the border of the sending site usesits own IP address and the address of the routerat the destination site in the new datagram.**	15



(ii) Consider a scenario where a telecommunicationexpert loves to help individuals and businesses.Assume that dial-up connections, cable modems, and DSL is available. Suggest and justify the best type of link in case of speed, security, reliability, and accessibility. Also, mention the drawbacks of other options that are not considered. — 10

DSL vs. Cable Modem

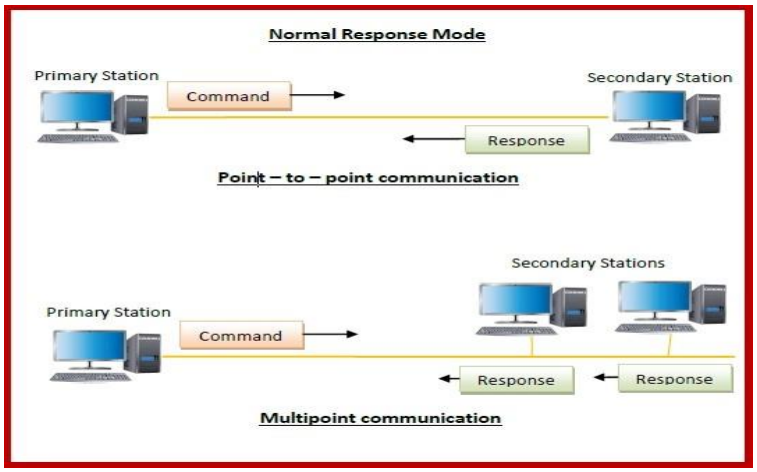
Issues	DSL	Cable Modem
Speed	• **DSL** offers a wide range of guaranteed speeds as high as 1 Mbps (symmetrical).	• **Cable Modem** exists on a shared network thereby making speed performance unpredictable; it is entirely contingent on network traffic volume.
Security	• **DSL** is on a closed, dedicated circuit making it less susceptible to outside hackers.	• **Cable Modem** is on a shared network making it more vulnerable to hackers.
Reliability	• **DSL** is on a closed, dedicated circuit enabling Crocker Communications to offer guaranteed speeds.	• **Cable Modem** exists on a shared network thereby making speed performance unpredictable. • **Cable Modem** may have multiple sources (or companies) providing local service and Internet access to consumers which takes away the convenience and accountability that comes with a single-source service provider.
Accessibility	• **DSL** utilizes ubiquitous, 100-year-old telephone infrastructure (RJ-11 jacks, copper phone wire, data backbones,etc.), which makes up nearly 100% market accessibility.	• **Cable Modem** utilizes young network infrastructure that is shown to have sporadic and inconsistent service availability. • **Cable Modem** has a slower rate of market infiltration because growth of accessibility is often on a case-by-case basis.

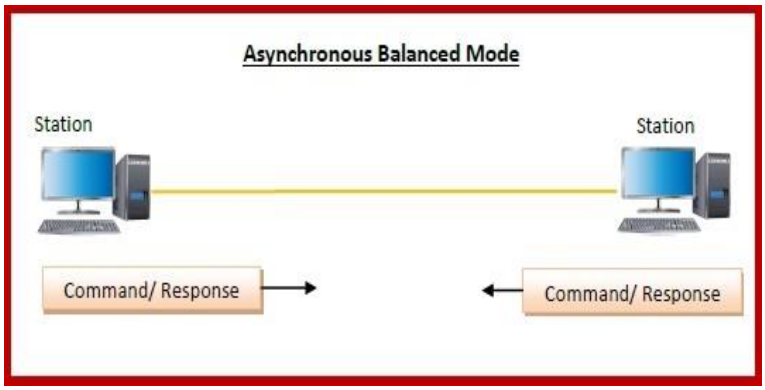
(OR)

4 i) The primary and secondary stations want to communicate with each other using commands and responses. Explain in detail the different transfer modesused for transfer in high data link control protocol. — 10

- **HDLC supports two types of transfer modes,normal response mode and asynchronous balanced mode.**
- **Normal Response Mode (NRM) − Unbalancedlink configuration. Two types of stations are there, a primary station that send commands and secondary station that can respond toreceived commands.**

- **It is used for both point - to - point andmultipoint communications.**
- **Asynchronous Balanced Mode (ABM) − Here,the configuration is balanced, i.e. each station can both send commands and respond to commands.**
- **It is used for only point - to - pointcommunications.**





Asynchronous Response Mode (ARM)

- **Unbalanced configuration**
- **Secondary may initiate transmissionwithout permission form primary**
- **Primary is responsible for connect,disconnect, error recovery, and initialization**
- **Rarely used**

HDLC Modes

	NRM	ARM	ABM
Station Type	Primary & Secondary	Primary & Secondary	Combined
Initiator	Primary	Either	Any

ii) Consider the original pattern 5

a. 11111111111011111101111110.

b. 01101111111111111110010.

What will be the outcome after the bit stuffing?

a. 11111011111011011111011111010
b. 01101111011111011111010010

(iii) Illustrate PPP frame format. 10

1. **Flag field - The flag field identifies the boundaries of a PPP frame. Its value is 01111110.**
2. **Address field - Because PPP is used for a point- to-point connection, it uses the broadcast addressused in most LANs, 11111111, to avoid a data link address in the protocol.**
3. **Control field - The control field is assigned the value 11000000 to show that, as in most LANs, the frame has no sequence number; each frame is independent.**
4. **Protocol field - The protocol field defines the typeof data being carried in the data field: user dataor other information.**
5. **Data field - This field carries either user data orother information.**
6. **FCS - The frame check sequence field is simplya 2-byte or 4-byte CRC used for error detection.**