Ans: no. 1 (a)

IP address = 17.50.96.81

Subnet Mask = 255.255.128.0

Block size => 256 - 128 = 128

and 96 < 127

Network address = 17.50.0.0/17

∴ Broadcast address = 17.50.127.255

∴ Default gateway = 17.50.0.2

Ans: no. 1(b)

Here,

S_ONE = 512 Hosts

BRAC LAN = 254 Hosts

S_THREE = 13 Hosts

WAN links = 2 Hosts each

For S_ONE,

required bits $\Rightarrow 2^9 = 512$

network bit = $32 - 9 = 23$

block size = 512

subnet → 17.50.0.0123

usable range = 17.50.0.1 - 17.50.1.254

broadcast = 17.50.1.255

For Brac LAN,

required bits $\Rightarrow 2^8 = 256$

network bit = $32 - 8 = 24$

block size = 256

subnet -> 17.50.02.0/24

usable range = 17.50.2.1 - 17.50.2.254

broadcast = 17.50.2.255

For S_THREE,

required bits => $2^4 = 16$

network bits => $32 - 4 = 28$

block size = 16

subnet -> 17.50.3.0/28

usable range = 17.50.3.1 - 17.50.3.14

broadcast = 17.50.3.15

For WAN links,

required bits => $2^2 = 4$

network bits => $32 - 2 = 30$

Ans:

Ans; no. 2 (a)

i) The network address is wrong. 10.10.1.1 is a host address. It would be, 10.10.1.0

In the DHCP server configuration, the DHCP Relay is missing. DHCP server is on R_ONE. But the clients are on R_THREE_LAN. DHCP Discover is broadcast and the routers do not forward it. To solve this problem, the DHCP Relay has to be configured on R_THREE.

ii) R_THREE router
Gig0/0 interface

iii) The set-up interface is not different from Q2.a.II. Because DHCP relay is always configured on the client-side LAN interface. Whether, WAN or direct link exists does not matter. Broadcast still originates from LAN.

Ans: no. 2(b)

i) Here,

data in 8th fragment ⇒ 230-22 = 28 bytes

total data before 8th fragment ⇒ 182 x 8 = 1456 bytes

total original data ⇒ 1456 + 208 = 1664 bytes

∴ original intact packet size ⇒ 1664 + 22 = 1686 bytes

Ans:

ii) Since all 7 previous fragments are equal.

the data per fragment is $\frac{1456}{7}$ = 208 bytes.

With the header, which is 22 bytes, the MTU is 230 bytes.

6th fragment's fragment offset,

5 fragments x 208 bytes or fragment = 1040 bytes

∴ offset ⇒ $\frac{1040}{8}$ = 130 Ans:

iii) The MF value is 1.

Ans: no: 3(a)

1) Distance Vector Routing Algorithm

ii) From B,

$B \to E = 3$

$A \to B - E = 5 + 3 = 8$

From C,

$C \to D = 4$

$A \to C \to D = 2 + 4 = 6$

From F,

$F \to E = 3$

$A \to F \to E = 4 + 3 = 7$

$F \to G = 4$

$A \to F \to G = 4 + 4 = 8$

$F \to I = 1$

$A \to F \to I = 4 + 1 = 5$

A	B	C	D	E	F	G	H	I	J	K
0	5	2	6	7	4	8	∞	5	∞	∞

Ans: no. 3(b)

Link state requires keeping track of neighbours,

→ to measure link costs

→ to build a complete network topology

→ to generate ~~tink~~ Link State Advertisements

→ to discover directly connected routers

→ to run Dijkstra's shortest path algorithm

Ans: no. 3(c)

Distance vector algorithm might not reflect the real shortest path because,

→ routing loops may occur temporarily

→ slow convergence

→ count-to-infinity problem

→ decisions based only on neighbor information

→ routers have no global topology knowledge

Ans: no. 4(a)

i) ip route 1.1.0.0 255.255.255.0 s0/1.2 5

ii) ip route 1.1.0.0 255.255.0255.0 s1/1.1 10

Ans: no. 4(b)

If a router does not have a static default route,

→ router checks routing table

→ if no matching route is found packet is dropped and 'ICMP Destination Unreachable' message is sent

→ router can not forward traffic to unknown networks.

Ans: no. 4(c)

Significance of '0' in [5010] is that static route do not use a routing metric. Hence, metric value is always 0.

Here, 50 is Administrative Distance. Default Administratine Distance for static route is 1. But the other value is 50 instead of 1 because this is a floating static route. It is used as a backup and activated only if a lower Administratine route fails

Ans; no. 5 (a)

Anycast addresses are assigned to multiple interfaces, but a packet sent to an anycast address is delivered to only the nearest interface. Whereas, multicast addresses are also assigned to multiple interfaces, but a packet sent to a multicast address is delivered to all interfaces that have joined that multicast group.

Anycast is used for DNS. By using anycast, a user's DNS query is automatically routed

to the geographically closest DNS server, reducing latency and providing load balancing.

Ans: no. 5(b)

In IPv6, routers do not fragment packets. Fragmentation is performed only by the source node.

If a router receives a packet larger than the MTU of the next hop link, it drops the packet and sends and ICMPv6 "Packet Too Big" message back to the source. The source node uses these ICMPv6 messages to determine the minimum MTU along the entire path and adjusts its packet size or performs fragmentation accordingly.

Ans: no. 5(c)

SLAAC is a stateless process because no server needs to maintain a record or 'state' of which IP addresses are assigned to which hosts.

SLAAC functions in these ways:

→ The host sends and RS message to find local routers.

→ The router responds with a RA containing the network prefix and prefix length.

→ The host combines the received prefix with its own interface identifier to form a unique global unicast address.

Ans:no.6 (a)

IP addresses are used in network layer. They are hierarchical because they consist of a network portion and a host portion, similar to a mailing address, allowing routers to group routes and keep routing tables manageable.

MAC addresses are used in the data link layer. They are flat because they are unique hardware identifiers assigned by manufacturers with no inherent relationship to the device's location or network structure.

Ans: no.6(b)

'Switch 1' receives the ARP request from Host A on interface Fa0/1. It records Host A's MAC address in its table and floods the broadcast frame out of all other ports.

'Switch 2' receives the frame from 'Switch 1' on interface Fa0/1. It also records Host A's MAC address and floods it to ports Fa0/2 and Fa0/3.

Both 'Switch 1' and 'Switch 2' will update the MAC address of Host A to their tables. Since the tables already contained Host D's information, those entries remain, but A's entry is new.

Ans: no. 6(c)

The 8 bytes consist of 7 bytes of alternating 1s and 0s used for bit synchronization, followed by 1 byte known as the start Frame Delimiter. The receiving device knows the preamble has ended when it detects the SFD sequence: 10 10 10 11. The two consecutive '1' bits at the very end signal that the actual frame data starts immediately after.