BRAC UNIVERSITY
Department of Computer Science and Engineering
CSE421: Computer Networking [Section 11] -Set A

Quiz: 06 **Total Marks: 10**
Summer 2025 **Time: 20 minutes**

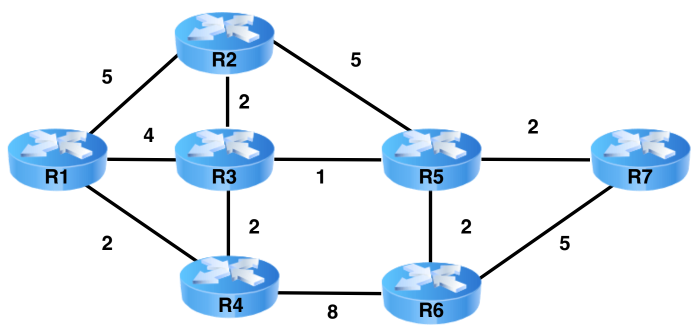
Name:	ID:	Sec:

Q1. Given your MAC address is AF:CC:FE:12:23:40.

a) Identify if the address is locally administered or globally unique. **[1]**

Ans: Locally administered.

Q2. Consider the following graph and **Construct** the Link-State Packet (LSP) for **R1** and **explain how** it is propagated throughout the network. **[3+1]**



Ans: The Link-State Packet (LSP) for R1 contains information about its directly connected neighbors and their respective costs. Here is the LSP for R1:

- **Router:** R1
- **Neighbors:**
  - R1->R2: Cost 5
  - R1->R3: Cost 4
  - R1->R4: Cost 2

When R1 generates its LSP, it sends this information to all directly connected neighbors, R2, R3 and R4. These neighbors will forward the LSP to their neighbors, ensuring every router in the network receives R1's LSP.

Q3. Using the network topology from (i), **calculate** the shortest path from R1 to R7. Assume that each router has received all link-state packets and constructed a complete view of the network. **[2]**

Ans: Using Dijkstra's algorithm, we compute the shortest path from R1 to R7.

Shortest path from R1 to R7: R1→R3→R5 →R7, with a total cost of 4+1+2=7.

Q4. In the network topology from (i), the link between R3 and R5 fails. **Describe** how R3 and R5 would detect the failure. **Explain** how the failure is communicated to other routers. **Recalculate** the shortest path from R1 to R7 after the failure. **[3]**

Failure Detection:

- R3 and R5 detect the link failure via a timeout mechanism (e.g., no HELLO messages received).

Failure Propagation:

- Both R3 and R5 update their LSPs to reflect that the link is no longer available and flood these updated LSPs to the network.

Recalculation:

After the failure, the network topology changes. Using Dijkstra's algorithm again:

- From R1, the shortest path to R7 is now R1→R2→R5→R7; cost = 5+5+2 = 12

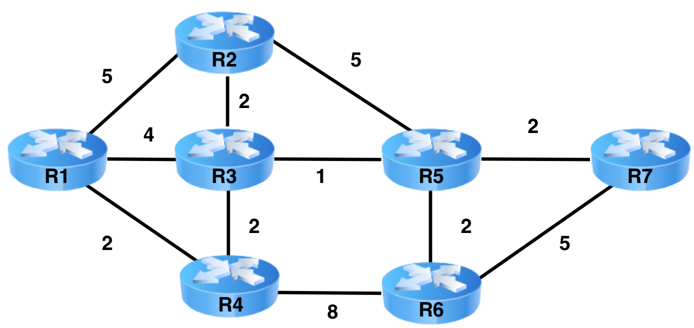
BRAC UNIVERSITY
Department of Computer Science and Engineering
CSE421: Computer Networking [Section 11] -Set B

Quiz: 06 **Total Marks: 10**
Summer 2025 **Time: 20 minutes**

Name:	ID:	Sec:

Q1. Given a MAC address EE:A9:B8:C7:D6:E5.
a) Identify if the above MAC address is a unicast or multicast address? **[1]**
Ans: Unicast

Q2. Consider the following graph and **Construct** the Link-State Packet (LSP) for **R2** and **explain how** it is propagated throughout the network. **[3+1]**



Ans: The Link-State Packet (LSP) for R2 contains information about its directly connected neighbors and their respective costs. Here is the LSP for R2:

- **Router:** R2
- **Neighbors:**
  - R2->R1: Cost 5
  - R2->R3: Cost 2
  - R2->R5: Cost 5

When R2 generates its LSP, it sends this information to all directly connected neighbors, R1, R3 and R5. These neighbors will forward the LSP to their neighbors, ensuring every router in the network receives R2's LSP.

Q3. Using the network topology from (i), **calculate** the shortest path from R2 to R6. Assume that each router has received all link-state packets and constructed a complete view of the network. [2]
Ans: Using Dijkstra's algorithm, we compute the shortest path from R2 to R6.
Shortest path from R2 to R6: R2→R3→R5 →R6, with a total cost of 2+1+2=5.

Q4. In the network topology from (i), the link between R3 and R5 fails. **Describe** how R3 and R5 would detect the failure. **Explain** how the failure is communicated to other routers. **Recalculate** the shortest path from R2 to R7 after the failure. **[3]**
Ans:
Failure Detection:
- R3 and R5 detect the link failure via a timeout mechanism (e.g., no HELLO messages received).

Failure Propagation:
- Both R3 and R5 update their LSPs to reflect that the link is no longer available and flood these updated LSPs to the network.

Recalculation:
After the failure, the network topology changes. Using Dijkstra's algorithm again:
- From R2, the shortest path to R7 is now R2→R5→R7; cost = 5+2 = 7

BRAC UNIVERSITY
Department of Computer Science and Engineering
CSE421: Computer Networking [Section 12] -Set A

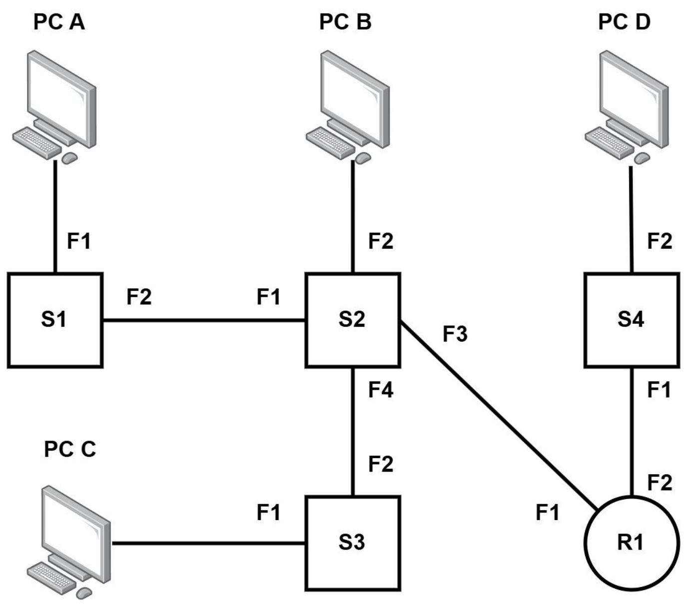
Quiz: 06 — **Total Marks: 10**
Summer 2025 — **Time: 20 minutes**

Name:	ID:	Sec:

Q1. What is the loopback address used in IPv6? **[1]**

::1/128

Q2. Refer to the figure in the right, **PC A** sends an ARP request for **PC B**.



a) State the source and destination MAC addresses in the ARP request packet. [2]

Source: MAC of PC A
Destination: FF:FF:FF:FF:FF:FF

b) Explain how **PC B** knows that it has to reply. [2]
IP Address matched

c) State what will router **R1** do with the packet and why. [2]
The **router R1 will not forward the ARP broadcast**. It is a layer-2 broadcast and routers do not forward Layer 2 broadcasts between interfaces. A router would only respond if the ARP were for one of its own IPs; otherwise it drops/ignores the broadcast.

Q3. Suppose all routers in an autonomous system are running OSPF (Link State Routing Protocol), and the network is converged. After this converged state, a new router is connected.
Explain briefly how the other routers will know about this new router, and its connected networks. **[3]**

The new router forms an adjacency, floods a Link State Advertisement (LSA) to all other routers, which then update their databases and run the Shortest Path First (SPF) algorithm to recalculate their routing tables.

BRAC UNIVERSITY
Department of Computer Science and Engineering
CSE421: Computer Networking [Section 12] -Set B

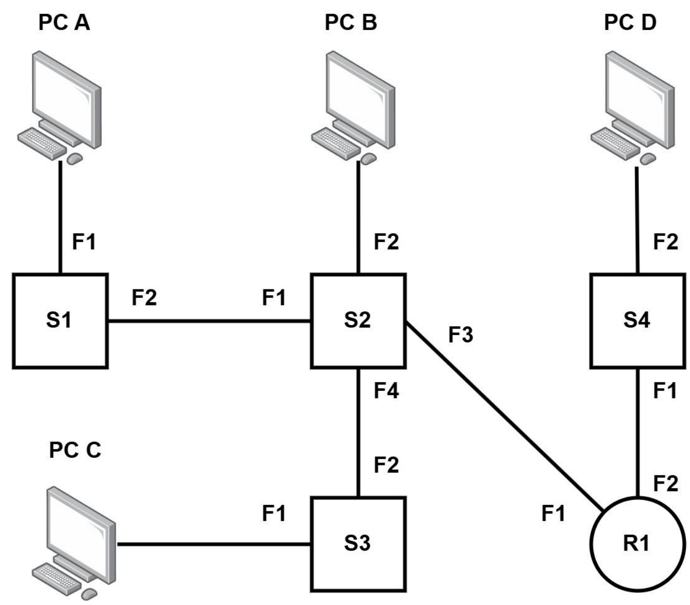
Quiz: 06 **Total Marks: 10**
Summer 2025 **Time: 20 minutes**

Name:	ID:	Sec:

Q1. A user's IPv6 packets are encapsulated within IPv4 packets while going from a source IPv6 network to the destination IPv6 network. State the name of the process. **[1]**

Ans: IPv6-over-IPv4 tunneling

Q2. Refer to the figure in the right, **PC A** sends an ARP request for **PC D**.



a) State the source and destination MAC addresses in the ARP request packet. **[2]**
Source: MAC of PC A
Destination: FF:FF:FF:FF:FF:FF

b) State what will router **R1** do with the packet and why. **[2]**
The **router R1 will not forward the ARP broadcast**.
It is a Layer 2 broadcast and routers do not forward Layer 2 broadcasts between interfaces. A router would only respond if the ARP were for one of its own IPs; otherwise it drops/ignores the broadcast.

c) After receiving the ARP reply, state what is the first action made by **PC A**. **[2]**
It first **updates its ARP cache/Table** with the IP→MAC mapping,

Q3. Suppose all routers in an autonomous system are running OSPF (Link State Routing Protocol), and the network is converged. After this converged state, a link between two routers is disconnected. **Explain briefly** how the other routers will detect the failure. **Explain** how the failure is communicated to other routers. **[3]**

When a link between two OSPF routers fails, the directly connected routers detect it quickly by missing Hello packets and interface status changes. They then generate updated Link State Advertisements (LSAs) reflecting the failure and flood these LSAs to all routers in the area. All routers receive the update and recompute their routing tables based on the new topology, ensuring fast network convergence and routing around the failure.