El-Oued University - Faculty of Exact Sciences
Department of Mathematics and Computer science
First-year Master in Internet of Things & Cybersecurity

Exam of Networks and Interconnection
2025 - 2026

First name: Last name:

Part 1: Network Models & Fundamentals (2.75)

1. Which layer of the OSI model is responsible for finding a "good route" and forwarding information hop-by-hop?
   A. Transport Layer
   B. Data Link (MAC) Layer
   C. Network Layer
   D. Physical Layer
2. What is the primary function of the MAC (Medium Access Control) layer?
   A. Determining the best path for a packet across the internet.
   B. Managing end-to-end flow control and jitter.
   C. Defining rules to access the communication medium and retransmitting packets if needed.
   D. Converting domain names into numerical IP addresses.
3. In the TCP/IP model, which protocols operate at the Application layer?
   A. HTTP
   B. ICMP
   C. DNS
   D. FTP
   E. ARP
   F. IP
4. True or False: The Physical Layer is responsible for transmitting raw bits over a communication channel. **True**
5. Which protocol is considered "connectionless and unreliable" and does not guarantee successful data transmission on its own?
   A. TCP
   B. IP
   C. SMTP
   D. FTP

Part 2: IPv4, DHCP & NAT (3)

6. An IPv4 address is composed of which two parts?
   A. System part and User part
   B. Network part and Host part
   C. MAC part and IP part
   D. Gateway part and Mask part

7. Which technology allows a router to map multiple private IP addresses to a single public IP address?
   A. DHCP
   B. DNS
   C. NAT
   D. RARP
8. What are the specific steps a DHCP server takes to assign an IP? (Select the correct sequence)
   A. Request, Discover, Offer, Acknowledge
   B. Discover, Offer, Request, Acknowledge
   C. Offer, Discover, Acknowledge, Request
   D. Discover, Request, Acknowledge, Offer
9. Why is NAT (Network Address Translation) used?
   A. To provide a unique MAC address to every device on the internet.
   B. To conserve the limited pool of public IPv4 addresses.
   C. To keep a private network secure from the external network.
   D. To increase the speed of the physical medium.
10. True or False: NAT works on the Data-Link layer (Layer 2) because it maps MAC addresses.

False

11. Which IPv4 class is reserved for Multicast addresses?
   A. Class B
   B. Class C
   C. Class D
   D. Class E

Part 3: Internet Protocols (ARP, ICMP, DNS) (3)

12. Which protocol is used to find the MAC address of a node when only its IP address is known?
   A. RARP
   B. ICMP
   C. ARP
   D. DHCP
13. When is RARP (Reverse ARP) typically used?
   A. When a machine knows its IP but needs its MAC.
   B. When a machine is first set up and doesn't have memory to store its IP address.
   C. To report errors in packet delivery.
   D. To translate a domain name into an IP address.
14. Which protocol is used by network devices to send error messages and operational information, such as "Destination Unreachable"?
   A. IGMP
   B. ICMP
   C. SMTP
   D. UDP
15. DNS (Domain Name System) is described as:
   A. A centralized database on a single server.
   B. A distributed database implemented in a hierarchy of name servers.
   C. A layer 2 protocol for hardware addressing.
   D. A protocol that only works for .com domains.

16. Match the DNS Domain Type:

1. .edu ___ A. Military
2. .mil ___ B. Educational
3. .org ___ C. Commercial
4. .com ___ D. Non-profit

1-B // 2-A // 3-D // 4-C

Part 4: Routing (Static & Dynamic) (4.75)

17. What is the primary difference between Static and Dynamic routing?
    A. Static routing is automatic; Dynamic is manual.
    B. Static routing requires manual table updates; Dynamic routing uses protocols to discover routes.
    C. Static routing is only for large networks; Dynamic is for small networks.
    D. Static routing uses Dijkstra's algorithm; Dynamic does not.
18. Which algorithm is used by Link-State protocols like OSPF to find the shortest path?
    A. Bellman-Ford Algorithm
    B. Best Path Algorithm
    C. Dijkstra’s Algorithm
    D. Binary Search Algorithm
19. In RIP (Routing Information Protocol), what is the maximum number of hops allowed before a destination is considered "Infinity" (unreachable)?
    A. 10
    B. 15
    C. 16
    D. 255
20. Which of the following are Link-State routing protocols?
    A. RIPv1
    B. OSPF
    C. BGP
21. What is a "Hybrid" routing protocol?
    A. A protocol that uses both IPv4 and IPv6.
    B. A protocol that combines features of distance-vector and link-state.
    C. A protocol that works only on wireless networks.
    D. A protocol that uses both TCP and UDP.
22. OSPF stands for:
    A. Open System Path Fast
    B. Open Shortest Path First
    C. Optimized Static Path Finding
    D. Operational Shortest Path Flow
23. Which protocol is an "External Gateway Protocol" (EGP) used to connect different Autonomous Systems?
    A. RIP
    B. EIGRP
    C. BGP
    D. OSPF
24. Identify the characteristics of BGP compared to OSPF:
    A. BGP is an Internal Gateway Protocol.
    B. BGP uses TCP for communication.
    C. BGP is used for large networks like the Internet.
    D. BGP is easier to implement than OSPF.
    E. BGP metric is determined by AS path, Weight, and Next Hop.

25. What happens when RIP encounters two paths with the same number of hops?
    A. It drops the packets.
    B. It chooses the path with the highest bandwidth.
    C. It performs load balancing.
    D. It sends an ICMP error message.

Part 5: Client-Server, P2P, and VPN (3)

26. In a Client-Server architecture, which of the following is true?
    A. There is no differentiation between clients and servers.
    B. The server provides services, and the client requests them.
    C. Each node is independent and possesses its own data.
    D. It is only appropriate for a limited number of users.
27. What is a major disadvantage of Peer-to-Peer (P2P) networks?
    A. High cost of central servers.
    B. Difficult to secure because each node is independent.
    C. Centralized data management makes it slow.
    D. Adding or deleting nodes is very complex.
28. Which architecture is better for large networks requiring centralized data management?
    A. P2P
    B. Client-Server
    C. Mesh Topology
    D. Star Topology
29. A VPN (Virtual Private Network) provides security by:
    A. Increasing the physical speed of the cable.
    B. Creating an encrypted "tunnel" for data over public networks.
    C. Removing the need for an IP address.
    D. Physically connecting two offices with a private fiber cable.
30. Compare VPN, Tor, and Proxy. Which one offers a decentralized network with no single controlling entity?
    A. VPN
    B. Tor
    C. Proxy
    D. NAT
31. What is the "virtual IP address" in a VPN context used for?
    A. To speed up the internet connection.
    B. To mask the user's actual identity and location.
    C. To bypass the need for a router.
    D. To provide a MAC address to the ISP.

Part 6: Scenario-Based Questions (3.5)

32. You are an admin for a small company with 10 computers. You want a cheap, easy-to-setup network to share files without a dedicated server. Which architecture do you choose?
    A. Client-Server
    B. P2P
    C. BGP Routing
    D. OSPF
33. A router receives a packet. It checks the destination IP and looks at its internal table to decide the next hop. What is this table called?
    A. ARP Table
    B. NAT Table
    C. Routing Table
    D. DNS Table

34. A user complains they can access websites via IP address (e.g., 8.8.8.8) but not by name (e.g., https://www.google.com/search?q=google.com). Which service is likely failing?

A. DHCP
B. NAT
C. DNS
D. ICMP

35. Which routing protocol would you choose for a network where you need very fast convergence and the shortest path based on bandwidth?

A. RIPv1
B. BGP
C. OSPF
D. Static Routing

36. Your company uses a private IP range (192.168.1.x) internally but only has one public IP from the ISP. Which process allows all employees to surf the web simultaneously?

A. DNS
B. ARP
C. NAT
D. RARP

37. If a RIP router receives a route update with a hop count of 16, what does it do?

A. It adds it to the table as a priority route.
B. It considers the network unreachable.
C. It subtracts 1 and forwards it.
D. It triggers a Dijkstra calculation.

38. Which technology is best for an investigative journalist who needs a high level of anonymity with no centralized control over their data?

A. Corporate VPN
B. HTTP Proxy
C. Tor
D. DHCP