

Q1: What does HDLC stand for?

Answer: High-Level Data Link Control.

Q2: What does EDC mean in data link protocols?

Answer: Error Detection and Correction bits used for redundancy.

Q3: Is error detection 100% reliable?

Answer: No, some errors might not be detected, but this is rare.

Q4: What is a Simplex Protocol?

Answer: A communication protocol that sends data in only one direction.

Q5: What is the purpose of a Stop-and-Wait Protocol?

Answer: It prevents flooding by waiting for acknowledgment before sending the next frame.

Q6: What is Go-Back-N Protocol?

Answer: A sliding window protocol where multiple frames are sent but retransmitted from the point of error.

Q7: What is Selective Repeat Protocol (SRP)?

Answer: It retransmits only the erroneous or lost frames instead of the entire sequence.

Q8: What does buffering mean in SRP?

Answer: Temporarily storing frames until missing ones arrive.

Q9: Does PPP provide flow control?

Answer: No, PPP does not provide flow control; it only detects errors.

Q10: What does PPP stand for?

Answer: Point-to-Point Protocol.

Q11: What are the three classes of MAC protocols?

Answer: Channel partitioning, random access, and taking turns.

Q12: What does TDMA stand for?

Answer: Time Division Multiple Access.

Q13: What is FDMA?

Answer: Frequency Division Multiple Access – dividing the channel into frequency bands.

Q14: What is ALOHA?

Answer: A random access protocol that allows collisions and retransmits after delay.

Q15: What is CSMA?

Answer: Carrier Sense Multiple Access – a protocol where devices listen before transmitting.

Q16: What does CSMA/CD stand for?

Answer: Carrier Sense Multiple Access with Collision Detection.

Q17: In which type of network is collision detection easier?

Answer: Wired LANs.

Q18: What happens in CSMA when the channel is busy?

Answer: The device defers its transmission until the channel becomes idle.

Q19: What does Ethernet CSMA/CD do when a collision occurs?

Answer: It aborts transmission, sends a jam signal, and performs binary backoff.

Q20: What happens to CSMA/CD efficiency as propagation delay decreases?

Answer: Efficiency increases and approaches 1.

Q21: What is a network architecture?

Answer: A network architecture is a set of layers and protocols that define how data is transmitted and managed in a network.

Q22: Why are protocols important in networking?

Answer: Protocols ensure reliable communication by defining rules for data transmission, error handling, and synchronization.

Q23: What are service primitives?

Answer: Service primitives are basic operations such as request, indicate, response, and confirm used between network layers.

Q24: What is the main role of the Physical Layer in OSI?

Answer: The Physical Layer converts bits into electrical signals and transmits them over communication channels.

Q25: What function does the Data Link Layer provide?

Answer: It provides error detection, error correction, and flow control.

Q26: What is the purpose of the Network Layer?

Answer: The Network Layer handles logical addressing and routing of packets from source to destination.

Q^{٧٧}: What two types of services are offered in networking?

Answer: Connection-oriented services and connectionless services.

Q^{٧٨}: What is the main function of the Transport Layer?

Answer: It ensures reliable end-to-end communication and manages error recovery and flow control.

Q^{٧٩}: What is the role of the Session Layer?

Answer: It manages dialogue control, token management, and synchronization between users.

Q^{٨٠}: What does the Presentation Layer do?

Answer: It ensures correct syntax and semantics of data, provides compression, and encryption.

Q^{٨١}: Give two examples of Application Layer protocols.

Answer: HTTP and FTP.

Q^{٨٢}: What is the difference between TCP and UDP?

Answer: TCP is connection-oriented and reliable, while UDP is connectionless and faster but less reliable.

Q^{٨٣}: Why is layering useful in network design?

Answer: It reduces complexity, allows interoperability, and simplifies teaching and development.

Q^{٨٤}: What is meant by “connectionless service”?

Answer: It means data can be sent without establishing a prior connection between sender and receiver.

Q^{٨٥}: What is the role of headers in communication?

Answer: Headers carry control information that helps different layers communicate and process data correctly.

Q^{٨٦}: What is static routing?

Answer: Static routing uses fixed routing paths that do not change automatically.

Q^{٨٧}: Which algorithm is used for the shortest path in static routing?

Answer: Dijkstra's algorithm.

Q^{٨٨}: Who developed the shortest path algorithm?

Answer: E.W. Dijkstra.

Q^{٨٩}: What is flooding in routing?

Answer: Flooding sends each incoming packet out on all outgoing links except the arrival link.

Q^{٩٠}: What prevents flooding packets from circulating indefinitely?

Answer: A hop counter limits the packet lifetime.

Q^{٩١}: What is a router?

Answer: A Layer ٣ device that connects two or more logical networks.

Q^{٩٢}: What layer does a router operate on?

Answer: Network layer (Layer ٣).

Q^{٩٣}: What is a routing graph?

Answer: A graph representation of routers (nodes) and links (edges).

Q^{٩٤}: What does N represent in graph abstraction?

Answer: The set of routers (nodes).

Q^{٩٥}: What does E represent in graph abstraction?

Answer: The set of links (edges).

Q^{٩٦}: What is link cost?

Answer: The metric value assigned to a link between two nodes.

Q^{٩٧}: How is path cost calculated?

Answer: By summing the costs of all links along the path.

Q^{٩٨}: What is the key question in routing algorithms?

Answer: What is the least-cost path between two nodes?

Q^{٩٩}: What is Link-State routing?

Answer: A dynamic routing algorithm where all nodes know the network topology.

Q^{١٠٠}: How do nodes obtain topology information in LS routing?

Answer: Through link-state broadcast.

Q^{١٠١}: What does D(v) represent in Dijkstra's algorithm?

Answer: The current least-cost estimate from source to node v.

Q^{١٠٢}: What does p(v) represent?

Answer: The predecessor of node v in the shortest path.

Q^{١٠٣}: What is N' in Dijkstra's algorithm?

Answer: The set of nodes whose least-cost path is known.

Q⁰⁴: What does Dijkstra's algorithm compute?

Answer : The least-cost paths from a source to all other nodes.

Q⁰⁵: Is Link-State routing static or dynamic?

Answer : Dynamic.

Q⁰⁶: What is a forwarding table?

Answer : A table that determines the next hop for each destination.

Q⁰⁷: What is algorithm complexity of Dijkstra?

Answer : Approximately $n(n+1)/2$ comparisons.

Q⁰⁸: What may cause routing oscillations?

Answer : Changing link costs based on traffic load.

Q⁰⁹: What is the first step in Link-State routing?

Answer : Discover neighbors.

Q¹⁰: What is the second step in LS routing?

Answer : Set distance/cost to each neighbor.

Q¹¹: What is the third step in LS routing?

Answer : Construct link-state packet.

Q¹²: What is the fourth step in LS routing?

Answer : Send and receive link-state packets.

Q¹³: What is the fifth step in LS routing?

Answer : Compute shortest paths.

Q¹⁴: What is the purpose of routing algorithms?

Answer : To find least-cost paths.

Q¹⁵: What does $c(x,y)$ represent?

Answer : Cost of link between node x and y.

Q¹⁶: Can link cost be based on bandwidth?

Answer : Yes, inversely proportional to bandwidth.

Q¹⁷: Can link cost depend on congestion?

Answer : Yes.

Q¹⁸: What is the result of Dijkstra's algorithm?

Answer : A shortest-path tree.

Q¹⁹: What is hop count?

Answer : The number of intermediate routers a packet passes through.

Q²⁰: What happens when hop counter reaches zero?

Answer : The packet is discarded.

Q²¹: What type of algorithm is Dijkstra?

Answer : Iterative algorithm.

Q²²: Does static routing adapt automatically to topology changes?

Answer : No.

Q²³: What is the main advantage of Link-State routing?

Answer : It provides accurate and optimal paths.

Q²⁴: What does a routing algorithm need as input?

Answer : Network topology and link costs.

Q²⁵: What is the final goal of routing in networks?

Answer : Efficient and reliable data delivery.

Q²⁶: What is routing?

Answer: Selecting the best path to forward packets between networks.

Q²⁷: Name the three types of routing.

Answer: Static, Default, Dynamic.

Q²⁸: What do routing tables store?

Answer: The best routes to all destinations.

Q²⁹: What metric does routing use to choose better paths?

Answer: Hop count, delay, bandwidth, or load.

Q³⁰: Define flooding.

Answer: Sending each packet to all neighbors.

Q⁹¹: What is the shortest path algorithm based on?

Answer: Dijkstra or similar cost-based methods.

Q⁹²: What is flow-based routing?

Answer: Routing based on traffic flow and load conditions.

Q⁹³: What information does a distance-vector router maintain?

Answer: Distances to neighbors and periodic updates.

Q⁹⁴: What is link-state routing?

Answer: Routing where routers share complete network topology.

Q⁹⁵: Name two dynamic routing protocols.

Answer: RIP and OSPF.

Q⁹⁶: What does BGP stand for?

Answer: Border Gateway Protocol.

Q⁹⁷: What is congestion control?

Answer: Techniques to prevent network overload.

Q⁹⁸: What is the role of ICMP?

Answer: Error reporting and diagnostics.

Q⁹⁹: What is the basic function of IP?

Answer: Delivering datagrams without guaranteed reliability.

Q¹⁰⁰: What is hierarchical routing?

Answer: Dividing the network into regions to scale routing.

Q¹⁰¹: What is broadcast routing?

Answer: Sending packets to all nodes.

Q¹⁰²: What is multicast routing?

Answer: Sending packets to selected group members.

Q¹⁰³: What does static routing require?

Answer: Manual configuration by administrators.

Q¹⁰⁴: What triggers dynamic routing updates?

Answer: Changes in link cost or failures.

Q¹⁰⁵: What are the two key functions of the network layer?

Answer: Routing and forwarding.

Q¹⁰⁶: What MATLAB command is used to create a structure with fields?

Answer: struct()

Q¹⁰⁷: In the encapsulation experiment, which header corresponds to the lowest OSI layer?

Answer: The link header (linkHeader).

Q¹⁰⁸: In the segment creation code, what does the field Data contain?

Answer: The application payload.

Q¹⁰⁹: In the TCP/UDP experiment, what does the expression `rand > lossProb` simulate?

Answer: Random packet loss.

Q¹¹⁰: In the stop-and-wait loop, when does the loop stop?

Answer: When a successful ACK is simulated.

Q¹¹¹: In NRZ encoding, what amplitude represents bit “1”?

Answer: +1

Q¹¹²: In Manchester encoding, how is bit “1” represented?

Answer: A positive half followed by a negative half.

Q¹¹³: What does the expression `Y*bits - 1` do in BPSK mapping?

Answer: Converts $0 \rightarrow -1$ and $1 \rightarrow +1$.

Q¹¹⁴: What MATLAB function adds Gaussian noise in the BER experiment?

Answer: randn()

Q¹¹⁵: Why is semilogy used for plotting BER vs SNR?

Answer: Because BER values are small and require a logarithmic scale.

Q¹¹⁶: How is an even parity bit calculated in MATLAB?

Answer: Using `mod(sum(msg), 2)`.

Q¹¹⁷: What is the CRC generator polynomial used in the experiment?

Answer: $x^3 + x^2 + 1$.

Q118: How is the CRC remainder computed?

Answer: By performing XOR-based polynomial division.

Q119: In bit stuffing, after how many consecutive 1s is a 0 inserted?

Answer: After 5 consecutive 1s.

Q120: What flag pattern is used in the bit-stuffing experiment?

Answer: 01111101

Q121: What is the purpose of frame delimiting?

Answer: To mark the beginning and end of a frame

Q122: What does the Data Link Layer do?

Answer: It transfers data frames between two physically connected nodes and ensures error detection.

Q123: What are the three main services of the Data Link Layer?

Answer: Framing, error control, and flow control.

Q124: What is framing?

Answer: Dividing the data stream into manageable blocks called frames.

Q125: What is the purpose of CRC?

Answer: To detect transmission errors in frames.

Q126: What are the two types of communication in the Data Link Layer?

Answer: Virtual communication and actual communication.

Q127: What is error detection?

Answer: Identifying if bits in a frame have been altered due to noise.

Q128: What is bit stuffing used for?

Answer: To prevent confusion between data and flag sequences.

Q129: What is Go-Back-N protocol?

Answer: A retransmission method where lost frames cause all subsequent frames to be resent.

Q130: What is Selective Repeat Protocol?

Answer: A retransmission method that resends only the lost or corrupted frames.

Q131: What is the purpose of flow control?

Answer: To manage the rate of data transmission between sender and receiver.

Q132: What is HDLC?

Answer: A high-level data link control protocol used for reliable communication.

Q133: What is the difference between error detection and correction?

Answer: Detection identifies errors; correction fixes them.

Q134: What is a Simplex protocol?

Answer: A communication system that allows data to flow in only one direction.

Q135: What is PPP used for?

Answer: For point-to-point communication, providing error detection but not correction.

Q136: What does buffering mean in Selective Repeat Protocol?

Answer: Temporarily storing frames until the missing ones are received.

Q137: What is Distance Vector Routing?

A: It is an intra-domain routing protocol that calculates the least-cost path using the Bellman-Ford algorithm..

Q138: Is Distance Vector used between Autonomous Systems?

A: No, it is used inside a single Autonomous System only..

Q139: On which algorithm is Distance Vector based?

A: It is based on the Bellman-Ford algorithm..

Q140: What is the goal of Distance Vector routing?

A: To find the least-cost (shortest) path to each destination.

Q141: What does each router maintain in DV routing?

A: A routing table containing the best known distance to each destination and the next hop..

Q142: How are DV tables updated?

A: By exchanging distance vectors with neighboring routers..

Q143: Write the Bellman-Ford equation.

A: $D_x(y) = \min\{c(x,v) + D_v(y)\}$ over all neighbors v.

Q144: What is $c(x,v)$?

A: It is the cost from node x to its neighbor v.

Q 1.40: What is $D_v(y)$?

A: It is the distance from neighbor v to destination y .

Q 1.41: What problem may occur in DV routing?

A: The count-to-infinity problem.

Q 1.42: What is routing loop?

A: A condition where packets circulate endlessly between routers.

Q 1.43: What protocol is based on Distance Vector?

A: RIP (Routing Information Protocol).

Q 1.44: How does DV convergence occur?

A: Through iterative exchange of distance vectors until stable values are reached.

Q 1.45: What is the main idea of DV algorithm?

A: Each node periodically sends its distance vector to neighbors.

Q 1.46: What happens if a DV router advertises wrong cost?

A: The error can propagate through the entire network.

Q 1.47: What is Hierarchical Routing?

A: A routing method that divides the network into regions to reduce routing table size.

Q 1.48: Why is hierarchical routing needed?

A: Because large networks cause routing tables to grow excessively.

Q 1.49: What is an Autonomous System (AS)?

A: A group of routers under a common administration running the same routing protocol.

Q 1.50: What is IGP?

A: Interior Gateway Protocol used within an AS.

Q 1.51: What is EGP?

A: Exterior Gateway Protocol used between Autonomous Systems.

Q 1.52: What does a router know in hierarchical routing?

A: It knows detailed routes inside its region only.

Q 1.53: What is inter-AS routing responsible for?

A: It determines how to forward packets between different Autonomous Systems.

Q 1.54: What happens when network size increases?

A: Routing tables become larger and consume more memory and bandwidth.

Q 1.55: What is message complexity in Link State (LS)?

A: $O(nE)$ messages for n nodes and E links.

Q 1.56: What is one robustness issue in DV?

A: Incorrect path cost advertisements can spread through the network.

Q 1.57: What does RIP stand for?

Answer: Routing Information Protocol.

Q 1.58: What type of routing protocol is RIP?

Answer: It is a distance vector routing protocol.

Q 1.59: What metric does RIP use to determine the best path?

Answer: RIP uses hop count as its routing metric.

Q 1.60: What is the maximum hop count allowed in RIP?

Answer: The maximum hop count is 15 hops.

Q 1.61: What does a hop count of 16 mean in RIP?

Answer: It means the destination is unreachable.

Q 1.62: How often do RIP routers exchange routing information?

Answer: Every 30 seconds.

Q 1.63: What information is contained in a RIP advertisement message?

Answer: It contains a list of destination networks and their hop counts.

Q 1.64: How many destination subnets can be included in a RIP advertisement?

Answer: Up to 255 destination subnets.

Q 1.65: What is the purpose of timers in RIP?

Answer: They control routing updates and maintain routing table stability.

Q 1.66: What is the function of the periodic timer in RIP?

Answer: It controls the sending of regular routing updates.

Q^{١٧٢}: What happens when the expiration timer reaches ١٨٠ seconds?

Answer: The route is marked as invalid.

Q^{١٧٣}: What is the function of the garbage collection timer?

Answer: It removes invalid routes from the routing table.

Q^{١٧٤}: What does OSPF stand for?

Answer: Open Shortest Path First.

Q^{١٧٥}: What type of routing protocol is OSPF?

Answer: It is a link-state routing protocol.

Q^{١٧٦}: Which algorithm does OSPF use to compute routes?

Answer: Dijkstra's shortest path algorithm.

Q^{١٧٧}: What information does each OSPF router maintain?

Answer: A complete topology map of the network.

Q^{١٧٨}: How are OSPF advertisements distributed?

Answer: They are flooded throughout the Autonomous System..

Q^{١٧٩}: What protocol layer carries OSPF messages?

Answer: OSPF messages are carried directly over IP.

Q^{١٨٠}: Does OSPF support multiple equal-cost paths?

Answer: Yes, OSPF supports multiple equal-cost paths.

Q^{١٨١}: What is hierarchical OSPF?

Answer: It is a routing structure that divides the network into areas..

Q^{١٨٢}: What are the two levels in hierarchical OSPF?

Answer: Local areas and backbone.

Q^{١٨٣}: What is the function of an Area Border Router (ABR)?

Answer: It connects different OSPF areas and summarizes routing information.

Q^{١٨٤}: What is the function of a backbone router in OSPF?

Answer: It routes traffic within the backbone network..

Q^{١٨٥}: What is a boundary router?

Answer: A router that connects an Autonomous System to other AS networks.

Q^{١٨٦}: Why is OSPF considered more scalable than RIP?

Answer: Because it uses hierarchical routing and link-state information.

Q^{١٨٧}: What is the main objective of the MATLAB experiment on Distance Vector Routing?

The main objective is to simulate the Distance Vector Routing algorithm using MATLAB and to compute the shortest path between nodes in a network using the Bellman–Ford algorithm.

Q^{١٨٨}: Which algorithm is implemented in the MATLAB program to compute the shortest path between nodes?

The MATLAB program implements the Bellman–Ford algorithm, which is used in Distance Vector Routing to determine the shortest path between network nodes.

Q^{١٨٩}: What does the adjacency (cost) matrix represent in the MATLAB routing simulation?

The adjacency or cost matrix represents the network topology, where each element indicates the cost or distance between two nodes in the network.

Q^{١٩٠}: In the MATLAB program, how are routers or network nodes represented?

Routers or network nodes are represented as indices of rows and columns in a matrix, where each index corresponds to a specific node in the network.

Q^{١٩١}: What is the purpose of initializing the distance vector in the MATLAB code?

The initialization sets the initial distance from a node to itself as zero and the distance to all other nodes as infinity or a large value, indicating that the path is initially unknown.

Q^{١٩٢}: Which MATLAB function is commonly used to display routing tables or matrices during the experiment?

The disp() function is commonly used in MATLAB to display routing tables, matrices, or computed results.

Q^{١٩٣}: What role does the for loop play in the MATLAB implementation of the Bellman–Ford algorithm?

The for loop is used to repeatedly update distance values by checking all possible paths between nodes until the shortest paths are determined.

Q^{١٩٤}: Why is an iterative update process required in the Distance Vector algorithm?

The iterative process allows nodes to update their routing tables based on information received from neighboring nodes until the shortest path information converges.

Q195: What condition in the MATLAB program determines when a routing table entry should be updated?

An entry is updated when a shorter path is found, meaning the new calculated distance is smaller than the previously stored distance.

Q196: How does the MATLAB program determine the minimum cost path between two nodes?

The program compares the current path cost with the cost obtained through intermediate nodes and selects the minimum cost path.

Q197: What information is typically stored in a routing table for each destination node?

A routing table usually stores the destination node, the minimum cost to reach that node, and the next hop router.

Q198: Why is the Bellman–Ford algorithm suitable for Distance Vector routing protocols?

It is suitable because it allows each router to compute shortest paths using only information from its immediate neighbors, which matches the behavior of Distance Vector routing.

Q199: How can MATLAB matrices be used to represent network topology in routing simulations?

MATLAB matrices can represent the network by storing link costs between nodes, where rows and columns correspond to different routers.

Q200: What output results are expected after running the MATLAB Distance Vector routing program?

The program outputs the final routing table or shortest distance matrix, showing the minimum cost paths between all nodes.

Q201: How can the MATLAB experiment help students understand real network routing behavior?

The experiment helps students visualize how routing algorithms update paths, calculate distances, and determine optimal routes in a network.

Q202: What is error detection?

Answer: The process of determining whether the received data has been corrupted during transmission.

Q203: What is error correction?

Answer: The process of identifying and fixing errors in the received data.

Q204: Define single-bit error.

Answer: When only one bit in the data unit changes from 1 to 0 or vice versa.

Q205: Define burst error.

Answer: When two or more bits in a data unit change due to noise.

Q206: What is redundancy used for?

Answer: It adds extra bits to help detect and correct errors.

Q207: Name three error detection techniques.

Answer: Parity check, checksum, and cyclic redundancy check (CRC).

Q208: What is parity checking?

Answer: A technique that uses an additional bit to make the total number of 1's even or odd.

Q209: What does VRC stand for?

Answer: Vertical Redundancy Check.

Q210: What is the limitation of VRC?

Answer: It cannot detect even-numbered errors.

Q211: What does LRC stand for?

Answer: Longitudinal Redundancy Check.

Q212: What is the main advantage of LRC?

Answer: It can detect burst errors.

Q213: What is checksum used for?

Answer: To verify the integrity of data in transport protocols.

Q214: What is CRC mainly used for?

Answer: To detect errors in digital networks and storage devices.

Q215: What is two-dimensional parity?

Answer: A method that applies parity both horizontally and vertically to detect multiple-bit errors.

Q216: What is the role of noise in error occurrence?

Answer: Noise causes bits to change value during transmission.

Q217: Why is redundancy needed in communication?

Answer: Because without it, errors cannot be detected.

Q218: Where are error control techniques implemented in OSI model?

Answer: At the data link and transport layers.

Q ٢١٩: What happens when parity bits don't match?

Answer: It indicates an error in transmission.

Q ٢٢٠: How does checksum detect errors?

Answer: By adding all data segments and checking if the sum matches at both ends.

Q ٢٢١: Why are error detection and correction important?

Answer: To ensure reliable and accurate data communication.

Q ٢٢٢: What is the main function of BGP?

A : Inter-domain routing between Autonomous Systems.

Q ٢٢٣: What is the difference between eBGP and iBGP?

A : eBGP connects different ASs, iBGP connects routers within the same AS.

Q ٢٢٤: Over which protocol are BGP messages exchanged?

A : TCP.

Q ٢٢٥: What is the purpose of BGP UPDATE message?

A : To advertise or withdraw routing paths.

Q ٢٢٦: What does the BGP KEEPALIVE message do?

A : Maintains the connection between peers.

Q ٢٢٧: What is the role of DHCP?

A : Dynamically assigning IP addresses to hosts.

Q ٢٢٨: What is the first message sent by a DHCP client?

A : DHCP Discover.

Q ٢٢٩: What is the response of the server to DHCP Discover?

A : DHCP Offer.

Q ٢٣٠: Which message confirms IP allocation in DHCP?

A : DHCP ACK.

Q ٢٣١: What address does a client use before getting an IP?

A : ٠,٠,٠,٠

Q ٢٣٢: What broadcast address is used in DHCP communication?

A : ٢٥٥,٢٥٥,٢٥٥,٢٥٥

Q ٢٣٣: Besides IP, what else can DHCP provide?

A : DNS server address and default router address.

Q ٢٣٤: What does ICMP stand for?

A : Internet Control Message Protocol.

Q ٢٣٥: What is ICMP mainly used for?

A : Error reporting and diagnostics.

Q ٢٣٦: Which ICMP type is used for Echo Request?

A : Type ٨.

Q ٢٣٧: Which ICMP type is Echo Reply?

A : Type ٠.

Q ٢٣٨: What does ICMP type ٣ indicate?

A : Destination unreachable.

Q ٢٣٩: What does ICMP type ١١ indicate?

A : TTL expired.

Q ٢٤٠: Which tool uses ICMP Echo messages?

A : Ping.

Q ٢٤١: What does Trace route measure?

A : The path and RTT to destination.

Q ٢٤٢: What protocol does Trace route send?

A : UDP segments.

Q ٢٤٣: Why does Trace route increase TTL gradually?

A : To discover each router along the path.

Q ٢٤٤: What message stops Trace route?

A : ICMP Port Unreachable.

Q ٢٤٥: ICMP messages are carried inside which protocol?

A : IP datagrams.

Q ٢٤٦: What is the purpose of TTL field?

A : Prevent infinite looping of packets.

Q ٢٤٧: What is an Autonomous System (AS)?

A : A group of routers under one administrative domain.

Q ٢٤٨ : What is path vector in BGP?

A : A list of ASs forming the route.

Q ٢٤٩: Which BGP message reports errors?

A : Notification.

Q ٢٥٠: What does DHCP lifetime indicate?

A : Duration of IP address lease.

Q ٢٥١: What port numbers does DHCP use?

A : ٦٧ (server) and ٦٨ (client).

Q ٢٥٢: What is the source IP in DHCP Discover?

A : ٠,٠,٠,٠

Q ٢٥٣: What is the destination IP in DHCP Discover?

A : ٢٥٥,٢٥٥,٢٥٥,٢٥٥

Q ٢٥٤: What does Ping verify?

A : Host reachability and responsiveness.

Q ٢٥٥: What information does ICMP include with error messages?

A : First ٨ bytes of the causing IP datagram.

Q ٢٥٦: What happens when TTL becomes zero?

A : Router discards packet and sends ICMP message.

Q ٢٥٧: What is the main responsibility of the transport layer?

Answer: Delivering messages from one process to another reliably.

Q ٢٥٨: Which protocol represents the transport layer in TCP/IP?

Answer: TCP.

Q ٢٥٩: What does the transport layer do to application messages?

Answer: It segments them into packets before sending to the network layer.

Q ٢٦٠: What kind of communication does the transport layer provide?

Answer: Logical communication between processes.

Q ٢٦١: What is the difference between the transport layer and network layer?

Answer: The network layer communicates between hosts, while the transport layer communicates between processes.

Q ٢٦٢: What are the two main transport layer protocols?

Answer: TCP and UDP.

Q ٢٦٣: What type of service does TCP provide?

Answer: Reliable, ordered, and connection-oriented delivery.

Q ٢٦٤: What type of service does UDP provide?

Answer: Unreliable, unordered, and connectionless delivery.

Q ٢٦٥: What does UDP stand for?

Answer: User Datagram Protocol.

Q ٢٦٦: Does UDP require connection establishment?

Answer: No, it is connectionless.

Q ٢٦٧: What are common applications that use UDP?

Answer: Multimedia applications, DNS, and SNMP.

Q ٢٦٨: What is the purpose of the UDP checksum?

Answer: Detecting errors in transmitted segments.

Q ٢٦٩: What does TCP stand for?

Answer: Transmission Control Protocol.

Q ٢٧٠: What does full duplex mean in TCP?

Answer: Data can flow in both directions simultaneously.

Q ٢٧١: What is MSS in TCP?

Answer: Maximum Segment Size.

Q ٢٧٢: What is flow control in TCP?

Answer: Preventing the sender from overwhelming the receiver.

Q^{٧٢}: What is congestion control in TCP?

Answer: Mechanism to prevent network overload.

Q^{٧٤}: What information is in a TCP segment header?

Answer: Ports, sequence number, acknowledgment number, window size, and checksum.

Q^{٧٥}: What is the function of the sequence number in TCP?

Answer: Ensuring ordered delivery of bytes.

Q^{٧٦}: What is the function of the acknowledgment number?

Answer: Confirming receipt of data.

Q^{٧٧}: What does the receive window (rwnd) indicate?

Answer: The free buffer space available at the receiver.

Q^{٧٨}: Why is TCP timeout important?

Answer: To retransmit lost segments efficiently.

Q^{٧٩}: What is RTT in TCP?

Answer: Round Trip Time.

Q^{٨٠}: What is multiplexing in the transport layer?

Answer: Gathering data from multiple sockets and adding headers.

Q^{٨١}: What is demultiplexing?

Answer: Delivering received segments to the correct socket.

Q^{٨٢}: What fields are used in demultiplexing?

Answer: IP addresses and port numbers.

Q^{٨٣}: What is a socket?

Answer: An interface between the application and transport layer.

Q^{٨٤}: What happens if UDP segments arrive out of order?

Answer: They are delivered to the application as they arrive.

Q^{٨٥}: What is the purpose of TCP flags SYN, FIN, RST?

Answer: Connection setup and termination control.

Q^{٨٦}: What is the role of the checksum in TCP?

Answer: Error detection in segments.

Q^{٨٧}: What is the difference between segment, packet, and frame?

Answer: Segment (transport), packet (network), frame (data link).

Q^{٨٨}: What does TCP guarantee that UDP does not?

Answer: Reliable and ordered delivery.

Q^{٨٩}: Why is UDP header smaller than TCP header?

Answer: Because UDP has fewer control features.

Q^{٩٠}: What is the role of the receiver buffer in TCP?

Answer: Temporarily storing received data before application reads it.

Q^{٩١}: Why is UDP considered faster than TCP?

Answer: Because it has no connection setup, flow control, or congestion control.