Multiple-Choice Questions on Network Models

Here is a comprehensive set of over 100 Multiple-Choice Questions (MCQs) focused on the OSI and TCP/IP network models. These questions are designed to cover all layers, their functions, protocols, and associated devices, making them ideal for preparing for your semester, GATE, and NET exams. Good luck! 🚀

General Concepts and Layered Models

1. Which model is a theoretical framework for understanding network communication, consisting of seven distinct layers? a) TCP/IP Model b) Internet Model c) OSI Model d) Hybrid Model **Answer**: c) OSI Model **Explanation**: The OSI (Open Systems Interconnection) model is a conceptual model that provides a universal standard for network protocols.
2. Which model is a practical, widely implemented standard used for the Internet? a) OSI Model b) TCP/IP Model c) ISO Model d) ANSI Model **Answer**: b) TCP/IP Model **Explanation**: The TCP/IP (Transmission Control Protocol/Internet Protocol) model is the foundation of the Internet.
3. The process of wrapping the data from the upper layer with a header and/or trailer from the current layer is called: a) Segmentation b) Encapsulation c) Framing d) De-multiplexing **Answer**: b) Encapsulation **Explanation**: Encapsulation is the process where each layer adds control information (headers or trailers) to the data unit from the layer above.
4. Which of the following is an advantage of using a layered network model? a) It makes the entire system more complex. b) It allows for faster data transmission. c) It simplifies network design and troubleshooting. d) It requires all manufacturers to use the same technology. **Answer**: c) It simplifies network design and troubleshooting. **Explanation**: A layered model breaks down a complex problem into smaller, more manageable sub-problems, making it easier to develop, debug, and understand.
5. What is the data unit at the Network Layer commonly referred to as? a) Frame b) Segment c) Packet d) Bit **Answer**: c) Packet **Explanation**: At the Network Layer, the data unit is called a packet. The Data Link layer uses frames, the Transport layer uses segments, and the Physical layer uses bits.

Physical Layer (Layer 1)

6. Which layer is responsible for the physical transmission of raw bits over a communication medium? a) Data Link Layer b) Network Layer c) Physical Layer d) Transport Layer **Answer**: c) Physical Layer
7. What is the primary data unit handled at the Physical Layer? a) Frames b) Packets c) Bits d) Segments **Answer**: c) Bits
8. Which of the following functions are performed by the Physical Layer? a) Logical addressing b) Error detection c) Data encryption d) Data rate and synchronization **Answer**: d) Data rate and synchronization **Explanation**: The Physical Layer is concerned with the timing and rate of bit transmission.

9. Which network device operates at the Physical Layer and regenerates the signal to extend the network's range? a) Switch b) Router c) Repeater d) Bridge **Answer**: c) Repeater **Explanation**: A repeater receives a signal, cleans it up, and retransmits it to a new cable segment, extending the network's physical reach.
10. A hub is a multi-port repeater that operates at which layer? a) Physical Layer b) Data Link Layer c) Network Layer d) Transport Layer **Answer**: a) Physical Layer
11. Which layer specifies the electrical and mechanical characteristics of the transmission medium? a) Physical Layer b) Data Link Layer c) Network Layer d) Application Layer **Answer**: a) Physical Layer
12. The Physical Layer of the OSI model corresponds most closely to which layer in the TCP/IP model? a) Transport Layer b) Internet Layer c) Network Access Layer d) Application Layer **Answer**: c) Network Access Layer **Explanation**: The TCP/IP Network Access Layer combines the functions of the Physical and Data Link layers of the OSI model.
13. Which of the following is NOT a function of the Physical Layer? a) Line coding b) Multiplexing c) Framing d) Physical topology **Answer**: c) Framing **Explanation**: Framing is a function of the Data Link Layer.
14. The term "modem" (modulator-demodulator) is a device that primarily functions to translate signals for the Physical Layer, converting: a) Packets to frames b) Digital data to analog signals and vice versa c) IP addresses to MAC addresses d) Frames to segments **Answer**: b) Digital data to analog signals and vice versa
15. What is the main responsibility of the Physical Layer? a) Creating a reliable end-to-end connection b) Providing logical addressing c) Handling the transmission medium d) Converting frames into packets **Answer**: c) Handling the transmission medium

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Data Link Layer (Layer 2)

16. Which layer is responsible for framing, error detection, and physical addressing (MAC address)? a) Physical Layer b) Data Link Layer c) Network Layer d) Transport Layer **Answer**: b) Data Link Layer
17. The Data Link Layer is divided into two sub-layers. They are: a) Network and Physical b) Logical Link Control (LLC) and Media Access Control (MAC) c) MAC and IP d) LLC and TCP **Answer**: b) Logical Link Control (LLC) and Media Access Control (MAC)
18. What is the data unit at the Data Link Layer? a) Bits b) Packets c) Frames d) Segments **Answer**: c) Frames
19. Which of the following devices operates at the Data Link Layer and filters traffic based on MAC addresses? a) Repeater b) Router c) Switch d) Hub **Answer**: c) Switch **Explanation**: A switch maintains a MAC address table to forward frames to the correct port, effectively segmenting a network.
20. A **MAC address** is a physical address that is unique to a network interface card (NIC). At which layer is it used? a) Network Layer b) Data Link Layer c) Transport Layer d) Application Layer **Answer**: b) Data Link Layer

21. Which error detection technique is a function of the Data Link Layer? a) Hamming code b) Parity check c) Checksum d) All of the above **Answer**: d) All of the above **Explanation**: The Data Link Layer is responsible for error detection and correction at the frame level. Parity, CRC, and Checksum are all methods used for this.

22. The primary responsibility of the **LLC (Logical Link Control)** sub-layer is: a) To manage access to the physical medium b) To handle multiple logical connections over a single physical link c) To perform routing of packets d) To manage the physical topology **Answer**: b) To handle multiple logical connections over a single physical link

23. A bridge is a device that connects two LAN segments and filters frames based on their MAC addresses. It operates at which layer? a) Physical Layer b) Data Link Layer c) Network Layer d) Transport Layer **Answer**: b) Data Link Layer

24. Which protocol is used by the Data Link Layer to perform flow control and error control? a) TCP b) IP c) ARQ (Automatic Repeat Request) d) UDP **Answer**: c) ARQ (Automatic Repeat Request) **Explanation**: ARQ protocols like Stop-and-Wait and Go-Back-N are used to ensure reliable delivery of frames over a link.

25. The Data Link Layer's framing function helps to: a) Assign IP addresses b) Encrypt data c) Create logical units of data for transmission d) Route packets **Answer**: c) Create logical units of data for transmission

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Network Layer (Layer 3)

26. Which layer is responsible for logical addressing (IP addressing) and routing of data packets? a) Data Link Layer b) Network Layer c) Transport Layer d) Application Layer **Answer**: b) Network Layer

27. What is the primary data unit at the Network Layer? a) Segment b) Frame c) Packet d) Bit **Answer**: c) Packet

28. Which device operates at the Network Layer and is used to connect different networks (inter-networking)? a) Switch b) Hub c) Bridge d) Router **Answer**: d) Router **Explanation**: A router uses IP addresses to forward packets between different networks.

29. The **Internet Protocol (IP)**, a key protocol of the TCP/IP suite, operates at which layer? a) Transport Layer b) Network Layer c) Data Link Layer d) Application Layer **Answer**: b) Network Layer

30. The function of **routing** is to: a) Select the best path for data packets to reach their destination. b) Detect and correct errors in data frames. c) Provide physical addressing. d) Ensure reliable data delivery between processes. **Answer**: a) Select the best path for data packets to reach their destination.

31. Which of the following is NOT a function of the Network Layer? a) Logical addressing b) Routing c) Congestion control d) Error control **Answer**: d) Error control **Explanation**: Error control at the packet level is typically handled by higher layers (e.g., Transport), although some protocols (like ICMP) can report errors. The Data Link Layer handles error control for frames.

32. The logical address used at the Network Layer is commonly known as a: a) Port number b) MAC address c) IP address d) Physical address **Answer**: c) IP address

33. Which protocol is used by the Network Layer to report errors and provide information about the network's health? a) TCP b) UDP c) ICMP d) HTTP **Answer**: c) ICMP (Internet Control Message Protocol)

34. A router's main task is to examine the destination IP address of a packet and use its routing table to: a) Encrypt the data b) Determine the next hop c) Add a MAC address d) Create a new frame **Answer**: b) Determine the next hop

35. The concept of **Classless Inter-Domain Routing (CIDR)** is primarily a function of which layer? a) Transport Layer b) Network Layer c) Data Link Layer d) Application Layer **Answer**: b) Network Layer

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Transport Layer (Layer 4)

36. Which layer is responsible for end-to-end communication and providing a reliable or unreliable connection between processes? a) Network Layer b) Transport Layer c) Session Layer d) Application Layer **Answer**: b) Transport Layer

37. The Transport Layer's data unit is known as a: a) Frame b) Segment c) Packet d) Datagram **Answer**: b) Segment **Explanation**: In TCP, the data unit is a segment; in UDP, it's a datagram. The term "segment" is commonly used as a general term for this layer.

38. Which two protocols are the main protocols of the Transport Layer? a) IP and ICMP b) TCP and UDP c) HTTP and FTP d) Ethernet and Wi-Fi **Answer**: b) TCP and UDP

39. The **Transmission Control Protocol (TCP)** is a connection-oriented protocol that provides: a) Unreliable, fast delivery b) Best-effort delivery c) Reliable, ordered, and error-checked delivery d) Network addressing **Answer**: c) Reliable, ordered, and error-checked delivery

40. Which of the following is a characteristic of **User Datagram Protocol (UDP)**? a) It is connection-oriented. b) It provides flow control. c) It is unreliable. d) It provides error recovery. **Answer**: c) It is unreliable.

41. A **port number** is used by the Transport Layer to identify: a) A specific computer on a network b) A specific process or application on a host c) A specific network interface card d) A router on the network **Answer**: b) A specific process or application on a host

42. What is the main function of the Transport Layer's flow control mechanism? a) To prevent collisions on the network b) To select the best path for packets c) To manage data transmission speed between a sender and receiver d) To resolve IP addresses to MAC addresses **Answer**: c) To manage data transmission speed between a sender and receiver

43. Which of the following is an example of an application that would likely use UDP instead of TCP? a) File Transfer Protocol (FTP) b) Web browsing (HTTP) c) Video streaming d) Email (SMTP) **Answer**: c) Video streaming **Explanation**: Video streaming prioritizes speed over reliability. Dropping a few frames is better than experiencing a long delay, which is why the unreliable but fast UDP is often preferred.

44. The process of reassembling segments into the original data at the destination is handled by which layer? a) Network Layer b) Data Link Layer c) Transport Layer d) Presentation Layer **Answer**: c) Transport Layer

45. The Transport Layer in the OSI model corresponds to which layer in the TCP/IP model? a) Internet Layer b) Transport Layer c) Network Access Layer d) Application Layer **Answer**: b) Transport Layer

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Session, Presentation, and Application Layers (L5, L6, L7)

46. Which layer is responsible for establishing, managing, and terminating sessions between two communicating applications? a) Presentation Layer b) Transport Layer c) Application Layer d) Session Layer **Answer**: d) Session Layer

47. The **Presentation Layer** is concerned with: a) Data representation and translation b) Logical addressing c) Routing d) Physical transmission of bits **Answer**: a) Data representation and translation **Explanation**: This layer ensures that data from the Application Layer of one system is readable by the Application Layer of another. It handles formatting, encryption, and compression.

48. Which layer provides network services directly to the end-user? a) Session Layer b) Presentation Layer c) Application Layer d) Transport Layer **Answer**: c) Application Layer

49. Protocols such as **HTTP, FTP, SMTP, and DNS** operate at which layer? a) Transport Layer b) Network Layer c) Data Link Layer d) Application Layer **Answer**: d) Application Layer

50. The function of **data compression** is a responsibility of which layer? a) Session Layer b) Presentation Layer c) Transport Layer d) Network Layer **Answer**: b) Presentation Layer

51. In the TCP/IP model, the functionality of the OSI's Session, Presentation, and Application layers is combined into a single layer called the: a) Transport Layer b) Internet Layer c) Application Layer d) Network Access Layer **Answer**: c) Application Layer

52. Which layer handles the synchronization of data exchange, such as checkpointing and recovery? a) Presentation Layer b) Session Layer c) Application Layer d) Transport Layer **Answer**: b) Session Layer **Explanation**: Checkpointing allows a session to resume from a known good point after a failure, which is a key function of the Session Layer.

53. Data encryption and decryption are handled at which layer? a) Network Layer b) Transport Layer c) Presentation Layer d) Physical Layer **Answer**: c) Presentation Layer

54. Which of the following is NOT a function of the Application Layer? a) Providing a user interface for network services b) File transfer c) Remote login d) End-to-end error checking and flow control **Answer**: d) End-to-end error checking and flow control **Explanation**: This is a core function of the Transport Layer.

55. The **DNS (Domain Name System)** protocol, which translates domain names into IP addresses, is an application-layer protocol. This means it operates at which layer? a) Transport Layer b) Network Layer c) Application Layer d) Session Layer **Answer**: c) Application Layer

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TCP/IP Model and Comparison with OSI

56. How many layers are there in the TCP/IP model? a) 7 b) 5 c) 4 d) 6 **Answer**: c) 4 **Explanation**: The original TCP/IP model had four layers: Application, Transport, Internet, and Network Access. Some modern interpretations show a five-layer model by splitting the Network Access Layer into Physical and Data Link.

57. The TCP/IP **Internet Layer** is functionally equivalent to which layer of the OSI model? a) Physical Layer b) Data Link Layer c) Network Layer d) Transport Layer **Answer**: c) Network Layer

58. Which OSI layers are combined into the **Application Layer** of the TCP/IP model? a) Physical, Data Link, and Network b) Session, Presentation, and Application c) Network, Transport, and Session d) Physical and Data Link **Answer**: b) Session, Presentation, and Application

59. The TCP/IP model is generally considered to be more flexible than the OSI model because: a) It is a conceptual model only. b) It has more layers. c) It is a standard used for the Internet. d) It is not tied to a specific technology. **Answer**: d) It is not tied to a specific technology.

60. Which protocol is used in the TCP/IP **Internet Layer** for logical addressing? a) TCP b) UDP c) IP d) HTTP **Answer**: c) IP

61. Which of the following statements is true about the OSI and TCP/IP models? a) The OSI model is a hybrid of the TCP/IP model. b) The TCP/IP model has more layers than the OSI model. c) Both models use a stack of layers to handle network communication. d) The OSI model is used exclusively for the Internet. **Answer**: c) Both models use a stack of layers to handle network communication.

62. The **Network Access Layer** in the TCP/IP model handles the functions of which OSI layers? a) Physical and Data Link b) Network and Transport c) Session and Presentation d) Application and Transport **Answer**: a) Physical and Data Link

63. Which layer in the TCP/IP model is responsible for providing reliable process-to-process communication? a) Application Layer b) Internet Layer c) Transport Layer d) Network Access Layer **Answer**: c) Transport Layer

64. A major difference between the OSI and TCP/IP models is that: a) The OSI model is a theoretical framework, while TCP/IP is a working protocol. b) The TCP/IP model has 7 layers, while OSI has 4. c) The OSI model does not use protocols. d) The TCP/IP model has a separate Session layer. **Answer**: a) The OSI model is a theoretical framework, while TCP/IP is a working protocol.

65. In the TCP/IP model, data from a host's application layer is passed down to which layer? a) Internet Layer b) Network Access Layer c) Physical Layer d) Transport Layer **Answer**: d) Transport Layer

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Advanced Concepts and Layer Interplay

66. Which layer is responsible for converting frames from one format to another (e.g., Ethernet to Wi-Fi)? a) Network Layer b) Data Link Layer c) Physical Layer d) Presentation Layer **Answer**: b) Data Link Layer **Explanation**: This is a key function of a bridge or a layer 2 switch, which can handle different LAN technologies.

67. The process of translating a logical address (IP) to a physical address (MAC) is handled by which protocol? a) DNS b) ARP (Address Resolution Protocol) c) ICMP d) RARP **Answer**: b) ARP (Address Resolution Protocol) **Explanation**: ARP is a protocol that operates between the Network and Data Link layers to resolve IP addresses to MAC addresses on a local network.

68. A firewall that filters traffic based on port numbers and source/destination IP addresses operates at which layers of the OSI model? a) Physical and Data Link b) Network and Transport c) Session and Presentation d) Application and Transport **Answer**: b) Network and Transport **Explanation**: Firewalls inspect IP addresses (Layer 3) and port numbers (Layer 4) to make filtering decisions.

69. Which of the following is a function of the **Data Link Layer** that is not typically a function of the **Physical Layer**? a) Signal encoding b) Bit synchronization c) Error detection d) Transmission medium definition **Answer**: c) Error detection

70. The "IP" in TCP/IP provides a connectionless service at the Network Layer. What does "connectionless" mean in this context? a) Data is sent without establishing a prior connection. b) Data is always guaranteed to arrive in the correct order. c) There is a dedicated path for the data. d) The service is unreliable. **Answer**: a) Data is sent without establishing a prior connection. **Explanation**: In a connectionless service, each packet is treated independently without a pre-established virtual circuit.

71. A router's forwarding decision is based on information from the: a) Data Link Layer header b) Transport Layer header c) Network Layer header d) Application Layer data **Answer**: c) Network Layer header **Explanation**: Routers use the destination IP address in the Network Layer header to make their routing decisions.

72. Which protocol is primarily responsible for the reliability of data delivery between two communicating hosts on the Internet? a) IP b) Ethernet c) HTTP d) TCP **Answer**: d) TCP **Explanation**: TCP (Transport Layer) provides reliable, ordered, and error-checked delivery. IP (Network Layer) is an unreliable, connectionless protocol.

73. The function of **demultiplexing** in the Transport Layer is to: a) Separate packets from different applications. b) Combine data from multiple applications into one stream. c) Send data to the correct physical medium. d) Translate an IP address to a MAC address. **Answer**: a) Separate packets from different applications. **Explanation**: The Transport Layer uses port numbers to direct incoming data to the correct application process.

74. A device that receives frames on one LAN and forwards them to a different LAN based on MAC addresses is a: a) Hub b) Repeater c) Bridge d) Router **Answer**: c) Bridge **Explanation**: A bridge operates at Layer 2 and connects two network segments at the Data Link Layer, forwarding frames based on MAC addresses.

75. The OSI model provides a strict hierarchy, but a router needs to access information from which two layers to function properly? a) Physical and Data Link b) Data Link and Network c) Network and Transport d) Transport and Application **Answer**: b) Data Link and Network **Explanation**: A router uses the Network Layer header (IP address) for routing but also needs the Data Link Layer header (MAC address) to forward the packet to the next hop on the local network.

Scenario and Application-based Questions

76. When you type a URL into a web browser, which layer of the TCP/IP model is first involved? a) Transport Layer b) Internet Layer c) Network Access Layer d) Application Layer **Answer**: d) Application Layer **Explanation**: The web browser is an application that uses application-layer protocols like HTTP and DNS.

77. An online video game that requires a fast, low-latency connection but can tolerate some data loss would likely use which Transport Layer protocol? a) TCP b) IP c) UDP d) ICMP **Answer**: c) UDP **Explanation**: UDP's connectionless and unreliable nature makes it faster, which is preferred for real-time applications where a slight delay to re-send lost data would be more detrimental than the data loss itself.

78. A hacker performs a "MAC address spoofing" attack, impersonating a legitimate device on a local network. This attack targets which layer of the OSI model? a) Physical Layer b) Data Link Layer c) Network Layer d) Transport Layer **Answer**: b) Data Link Layer **Explanation**: MAC addresses are physical addresses used at the Data Link Layer.

79. A traceroute command sends a series of packets to a destination and reports the IP address of each router along the path. This command relies on which protocol? a) TCP b) UDP c) ICMP d) ARP **Answer**: c) ICMP **Explanation**: The traceroute command sends packets with a TTL (Time-to-Live) field that is incremented. When a router's TTL expires, it sends an ICMP "Time Exceeded" message back to the source, allowing the source to identify the router's IP address.

80. A proxy server that caches web pages and filters requests for malicious content is operating at which layer? a) Transport Layer b) Network Layer c) Presentation Layer d) Application Layer **Answer**: d) Application Layer **Explanation**: A proxy server works at the application level to interpret and modify HTTP requests.

81. When an email is sent, what is the order of encapsulation as the data travels down the TCP/IP stack from the sender's perspective? a) Segment, Packet, Frame b) Packet, Frame, Segment c) Frame, Packet, Segment d) Segment, Frame, Packet **Answer**: a) Segment, Packet, Frame **Explanation**: Email data (Application Layer) is segmented by the Transport Layer, encapsulated into packets by the Internet Layer, and then framed by the Network Access Layer.

82. Which of the following is NOT a function of the **Transport Layer**? a) Logical addressing b) Flow control c) Error control d) Segmentation **Answer**: a) Logical addressing **Explanation**: Logical addressing is a function of the Network Layer.

83. The process of converting a host's logical address (IP) into a physical address (MAC) is known as: a) Routing b) Encapsulation c) Address Resolution d) Tunneling **Answer**: c) Address Resolution

84. A device that can connect different network segments, even if they have different protocols, by interpreting the destination address in the header is a: a) Repeater b) Hub c) Bridge d) Router **Answer**: d) Router **Explanation**: A router uses the logical (IP) address to route packets across different networks with potentially different underlying technologies.

85. Which OSI layer is responsible for translating data formats, such as converting text from ASCII to EBCDIC? a) Application Layer b) Presentation Layer c) Session Layer d) Data Link Layer **Answer**: b) Presentation Layer

86. What is the main reason that the TCP/IP model became the standard for the Internet, rather than the OSI model? a) The OSI model was developed too late. b) The TCP/IP model was a more robust and practical implementation. c) The OSI model was too simple. d) The TCP/IP model was exclusively developed by a single company. **Answer**: b) The TCP/IP model was a more robust and practical implementation. **Explanation**: TCP/IP was a working, proven protocol stack that was widely adopted by government agencies and academic institutions before the OSI model was fully developed and standardized.

87. Which of the following is a function of the **Data Link Layer** but not the **Network Layer**? a) Routing b) Logical addressing c) Frame synchronization d) Congestion control **Answer**: c) Frame synchronization

88. The **Session Layer** of the OSI model is responsible for: a) Establishing a dialogue between applications. b) Providing physical addressing. c) Encrypting and compressing data. d) Translating domain names to IP addresses. **Answer**: a) Establishing a dialogue between applications.

89. Which of the following is a key difference between the OSI and TCP/IP models? a) TCP/IP is a conceptual model, while OSI is an implemented protocol. b) The TCP/IP model's Application Layer combines three of the OSI layers. c) TCP/IP has more layers than the OSI model. d) The OSI model does not include a Transport Layer. **Answer**: b) The TCP/IP model's Application Layer combines three of the OSI layers.

90. A switch uses a MAC address table to: a) Route packets to a different network. b) Forward frames to the correct port. c) Resolve an IP address to a MAC address. d) Create new IP packets. **Answer**: b) Forward frames to the correct port.

91. The data unit at the **Physical Layer** is a bit, and at the **Data Link Layer** it is a frame. What is the process of converting a frame into a series of bits called? a) Encapsulation b) Framing c) Decapsulation d) Serialization **Answer**: d) Serialization **Explanation**: The Data Link Layer passes a frame to the Physical Layer, where it is converted into a serial bit stream for transmission.

92. When a TCP segment arrives at the destination, which layer removes the TCP header to reveal the original data? a) Application Layer b) Session Layer c) Presentation Layer d) Transport Layer **Answer**: d) Transport Layer **Explanation**: Each layer is responsible for both adding its own header (encapsulation) and removing it (decapsulation).

93. The **Network Layer** provides a service to the **Transport Layer**. What is this service? a) End-to-end reliable communication b) Process-to-process communication c) Best-effort delivery of packets d) Physical transmission of bits **Answer**: c) Best-effort delivery of packets **Explanation**: The Network Layer's job is to get a packet from a source host to a destination host, but it does not guarantee delivery. This is a connectionless and unreliable service.

94. The TCP/IP model does not have a separate Session layer because: a) Session management is considered a function of the Application Layer. b) It is a simpler, four-layer model. c) Sessions are not needed for Internet communication. d) The Internet Protocol handles sessions. **Answer**: a) Session management is considered a function of the Application Layer.

95. In the context of the OSI model, what does the term "PDU" stand for? a) Protocol Data Unit b) Packet Delivery Unit c) Primary Data Unit d) Physical Data Unit **Answer**: a) Protocol Data Unit **Explanation**: PDU is the general term for the data unit at each layer (e.g., segment, packet, frame).

96. Which layer is responsible for defining the logical link between devices on the same physical medium? a) Network Layer b) Transport Layer c) Data Link Layer d) Physical Layer **Answer**: c) Data Link Layer

97. An HTTP request from a web browser is an example of a message at which layer? a) Transport Layer b) Network Layer c) Presentation Layer d) Application Layer **Answer**: d) Application Layer

98. In the OSI model, a router makes its forwarding decisions using information found in which layer's header? a) Layer 1 b) Layer 2 c) Layer 3 d) Layer 4 **Answer**: c) Layer 3 **Explanation**: The router inspects the IP address in the Network Layer header.

99. Which of the following is a function of the **Transport Layer** but not the **Network Layer**? a) Routing b) Addressing c) Segmentation and reassembly d) Congestion control **Answer**: c) Segmentation and reassembly **Explanation**: While both layers can have a form of congestion control and addressing, only the Transport Layer segments the data stream and reassembles it at the destination.

100. Which layer is responsible for the overall end-to-end reliability of a data transmission session? a) Data Link Layer b) Network Layer c) Transport Layer d) Application Layer **Answer**: c) Transport Layer

101. The **TCP/IP model's Application Layer** is the equivalent of which three OSI layers? a) Physical, Data Link, and Network Layers b) Session, Presentation, and Application Layers c) Transport, Session, and Presentation Layers d) Internet and Transport Layers **Answer**: b) Session, Presentation, and Application Layers

102. A device that receives a corrupted frame from the Physical Layer and discards it based on a checksum error operates at which layer? a) Transport Layer b) Data Link Layer c) Network Layer d) Physical Layer **Answer**: b) Data Link Layer **Explanation**: The Data Link Layer's framing function includes a trailer with a checksum or CRC for error detection.

103. Which layer would be responsible for converting an image file format from a JPEG on one computer to a GIF on another? a) Session Layer b) Presentation Layer c) Transport Layer d) Application Layer **Answer**: b) Presentation Layer

Here are 100 multiple-choice questions (MCQs) focused on the network model, especially the OSI and TCP/IP models, their layers, functionalities, addressing, and protocol aspects. These are suitable for semester exams, GATE, and NET. Each question has one correct answer indicated.

OSI and Network Model Basics

1. OSI stands for:
   A) Open System Interconnection
   B) Operating System Interface
   C) Optical Service Implementation
   D) Open Service Internet
   Answer: A

2. The OSI model has how many layers?
   A) 3
   B) 5
   C) 6
   D) 7
   Answer: D

3. Which layer in OSI is responsible for data encryption and decryption?
   A) Physical
   B) Presentation
   C) Network
   D) Application
   Answer: B

4. Which model was developed first?
   A) OSI
   B) TCP/IP
   C) ISO
   D) IEEE
   Answer: B

5. In OSI, user support layers are:
   A) Application, Presentation, Session
   B) Physical, Data Link, Network
   C) Transport, Physical, Network
   D) Transport, Data Link, Network
   Answer: A

6. Which layer in the OSI model is responsible for routing?
   A) Data Link
   B) Network
   C) Transport
   D) Session
   Answer: B

7. What is the top-most layer in OSI model?
   A) Presentation
   B) Application
   C) Physical
   D) Network
   Answer: B

8. At which OSI layer is a switch mainly operating?
   A) Network
   B) Physical
   C) Data Link
   D) Session
   Answer: C

9. How many layers does the TCP/IP model contain?
   A) 4

B) 5
C) 6
D) 7
Answer: B

10. The primary function of the OSI session layer is:
    A) Routing
    B) Dialog control
    C) Encryption
    D) Framing
    Answer: B

11. Which layer checks for physical errors in data?
    A) Data Link
    B) Transport
    C) Application
    D) Presentation
    Answer: A

12. The Internet model consists of _____ layers.
    A) 3
    B) 5
    C) 7
    D) 8
    Answer: B

13. The layer that ensures end-to-end delivery of the entire message is:
    A) Network
    B) Transport
    C) Data Link
    D) Physical
    Answer: B

14. The OSI layer responsible for logical addressing is:
    A) Transport
    B) Network
    C) Physical
    D) Data Link
    Answer: B

15. Which address is used by the transport layer to deliver messages to the correct application?
    A) Logical
    B) Physical
    C) Port
    D) Specific
    Answer: C

16. ICMP operates at which layer?
    A) Application
    B) Network
    C) Data Link

D) Session
Answer: B

17. In the OSI model, headers are ___ as data moves up the layers.
    A) Added
    B) Removed
    C) Changed
    D) Nothing
    Answer: B

18. Which OSI layer reformats data to ensure interoperability?
    A) Physical
    B) Network
    C) Presentation
    D) Session
    Answer: C

19. The _____ layer links the network and user support layers.
    A) Transport
    B) Physical
    C) Data Link
    D) Application
    Answer: A

20. Physical addressing is done by:
    A) Application layer
    B) Data Link layer
    C) Session layer
    D) Presentation layer
    Answer: B

Detailed Layer-wise Questions

21. The session layer lies between which two layers?
    A) Transport and Presentation
    B) Network and Data Link
    C) Transport and Network
    D) Data Link and Presentation
    Answer: A

22. Framing is managed at which layer?
    A) Physical
    B) Data Link
    C) Transport
    D) Application
    Answer: B

23. Which layer changes bits into electromagnetic signals?
    A) Data Link
    B) Physical
    C) Network

D) Transport
Answer: B

24. Which OSI layer is responsible for process-to-process communication?
    A) Network
    B) Physical
    C) Transport
    D) Data Link
    Answer: C

25. The OSI model was developed by:
    A) ISO
    B) IEEE
    C) IETF
    D) ITU
    Answer: A

26. Application layer protocols include:
    A) FTP, SMTP, HTTP
    B) ARP, RARP
    C) IP, ICMP
    D) All layers
    Answer: A

27. Which layer is responsible for encoding, compression, and portability of data?
    A) Presentation
    B) Application
    C) Session
    D) Physical
    Answer: A

28. Session layer provides:
    A) Access to network
    B) Dialog control
    C) Addressing
    D) Bit timing
    Answer: B

29. Transport layer protocols include:
    A) UDP, TCP
    B) IP, ARP
    C) HTTP, SMTP
    D) DNS, DHCP
    Answer: A

30. DNS works at which layer?
    A) Application
    B) Presentation
    C) Session
    D) Network
    Answer: A

TCP/IP vs OSI Model

31. Which protocols work at the Transport layer in TCP/IP?
    A) ARP, RARP
    B) TCP, UDP
    C) IP, ICMP
    D) DNS, SMTP
    Answer: B

32. SMTP works on which layer in TCP/IP and OSI?
    A) Transport (TCP/IP), Presentation (OSI)
    B) Application (TCP/IP & OSI)
    C) Network (TCP/IP), Application (OSI)
    D) Application (TCP/IP), Network (OSI)
    Answer: B

33. The Network Access layer in TCP/IP model corresponds to which OSI layers?
    A) Application
    B) Data Link and Physical
    C) Session and Presentation
    D) Network and Session
    Answer: B

34. Which layer in the TCP/IP model deals with logical addressing and routing?
    A) Network
    B) Internet
    C) Application
    D) Transport
    Answer: B

35. The presentation and session layers of OSI are handled by the _____ layer in TCP/IP.
    A) Network
    B) Application
    C) Physical
    D) Transport
    Answer: B

36. Which of the following is NOT a layer in the TCP/IP model?
    A) Network
    B) Presentation
    C) Physical
    D) Application
    Answer: B

Protocols and Addressing

37. FTP uses which protocol for control information?
    A) UDP
    B) TCP
    C) ICMP

D) ARP
Answer: B

38. DHCP is used at:
    A) Application Layer
    B) Network Layer
    C) Data Link Layer
    D) Transport Layer
    Answer: A

39. Which protocol is connectionless?
    A) TCP
    B) UDP
    C) FTP
    D) HTTP
    Answer: B

40. A port address is usually how many bits in TCP/IP?
    A) 8
    B) 16
    C) 32
    D) 48
    Answer: B

41. Which address is unique for every device on a local network?
    A) Physical address
    B) Logical address
    C) Port address
    D) Specific address
    Answer: A

42. Which protocol translates logical addresses to physical addresses?
    A) DHCP
    B) ARP
    C) IP
    D) TCP
    Answer: B

43. IPv6 addresses are:
    A) 32-bit
    B) 64-bit
    C) 128-bit
    D) 48-bit
    Answer: C

44. The function of segmentation and reassembly is at:
    A) Application
    B) Network
    C) Transport
    D) Data Link
    Answer: C

45. If data units are shorter than expected, which layer handles size adjustments?
    A) Application
    B) Transport
    C) Data Link
    D) Network
    Answer: B

46. Routing is performed by:
    A) Switch
    B) Router
    C) Repeater
    D) Hub
    Answer: B

Reference Model Miscellaneous

47. The OSI model is called “open” because:
    A) Information is publicly available
    B) Data is not encrypted
    C) It’s not proprietary
    D) All computers can be connected
    Answer: C

48. The lowest layer in OSI model is:
    A) Network
    B) Data Link
    C) Physical
    D) Transport
    Answer: C

49. Which layer is closest to the end user?
    A) Application
    B) Presentation
    C) Session
    D) Physical
    Answer: A

50. Presentation layer transforms information between:
    A) Network representation and application
    B) Physical network and computer
    C) Application and process
    D) Network and data link
    Answer: A

Addressing and Data Encapsulation

51. Which address is used to deliver a packet from a source to a destination across multiple networks?
    A) Logical address
    B) Physical address
    C) Port address

D) Specific address
Answer: A

52. What does encapsulation mean?
    A) Adding extra information
    B) Adding headers/trailers
    C) Encrypting data
    D) Changing file format
    Answer: B

53. Transport layer provides:
    A) Bitwise transmission
    B) End-to-end communication
    C) Hardware addressing
    D) Encryption
    Answer: B

54. The layer responsible for framing is:
    A) Network
    B) Data Link
    C) Transport
    D) Physical
    Answer: B

55. In the OSI model, data is referred to as ‘frames’ at which layer?
    A) Application
    B) Presentation
    C) Data Link
    D) Network
    Answer: C

56. Checksums for reliable transmission are used at:
    A) Data Link
    B) Transport
    C) Application
    D) Physical
    Answer: B

Specialized Protocols and Functions

57. Which protocol handles error reporting in the Internet layer?
    A) IP
    B) TCP
    C) ICMP
    D) ARP
    Answer: C

58. Which OSI layer deals mainly with syntax and semantics of information?
    A) Data Link
    B) Presentation
    C) Network

D) Session
Answer: B

59. Which protocol is used for sending email?
    A) FTP
    B) SMTP
    C) HTTP
    D) DHCP
    Answer: B

60. Remote log-in is provided at which layer?
    A) Session
    B) Application
    C) Data Link
    D) Network
    Answer: B

Real-world Application and Layer Comparison

61. The ___ layer establishes, maintains, and synchronizes the interaction between communicating systems.
    A) Application
    B) Session
    C) Network
    D) Data Link
    Answer: B

62. File transfer is an application of:
    A) Presentation
    B) Application
    C) Data Link
    D) Physical
    Answer: B

63. Which header contains the sender and receiver's IP address?
    A) Physical Layer
    B) Data Link Layer
    C) Network Layer
    D) Application Layer
    Answer: C

64. Which layer controls how data is presented to the user?
    A) Presentation
    B) Network
    C) Data Link
    D) Application
    Answer: A

65. HTTP uses which protocol for data transport?
    A) TCP
    B) UDP

C) IP
D) ARP
Answer: A

66. Address Resolution Protocol (ARP) maps:
A) Logical to port address
B) IP to MAC address
C) MAC to IP address
D) Port to IP address
Answer: B

67. Network layer ensures:
A) Node-to-node delivery
B) Hop-to-hop delivery
C) Source-to-destination delivery
D) Process-to-process delivery
Answer: C

68. Which two layers in OSI model combine into “host-to-network” in TCP/IP?
A) Network, Data Link
B) Data Link, Physical
C) Network, Physical
D) Session, Application
Answer: B

69. Which layer is responsible for dialogue control and synchronization?
A) Physical
B) Session
C) Presentation
D) Application
Answer: B

70. The port number for HTTP is:
A) 20
B) 21
C) 80
D) 110
Answer: C

Diagnostic, Testing, and Misc

71. Which command checks network connectivity at the Network layer?
A) ftp
B) ping
C) telnet
D) nslookup
Answer: B

72. Logical addressing is essential for:
A) LAN only
B) WAN only

C) Internet
D) Both LAN and WAN
Answer: D

73. Segmentation is used to:
A) Split data for easier handling
B) Group layers
C) Encrypt files
D) Control routing
Answer: A

74. TCP is:
A) Connection-oriented
B) Connectionless
C) Reliable
D) Both A and C
Answer: D

75. Which protocol provides unreliable data transfer?
A) TCP
B) UDP
C) SMTP
D) DHCP
Answer: B

Layer Responsibilities & Properties

76. Which OSI layer is not present in TCP/IP model?
A) Network
B) Application
C) Session
D) Data Link
Answer: C

77. Which OSI layer packages bits into frames?
A) Physical
B) Data Link
C) Network
D) Transport
Answer: B

78. Which layer in OSI is concerned with bit rate control?
A) Data Link
B) Transport
C) Session
D) Physical
Answer: D

79. What layer is responsible for physical addressing?
A) Data Link
B) Network

C) Application
D) Physical
Answer: A

80. Which transmission is handled by the Transport layer?
A) Host-to-host
B) Node-to-node
C) Source-to-destination
D) Hop-to-hop
Answer: A

Layer Interactions and Conversions

81. The movement of data between network devices is managed by:
A) Presentation layer
B) Data link layer
C) Application layer
D) Session layer
Answer: B

82. The process of adding headers as data moves down the protocol stack is called:
A) Encapsulation
B) Encryption
C) Compression
D) Transmission
Answer: A

83. The process of removing headers as data moves up is called:
A) Formation
B) Multiplexing
C) Decapsulation
D) Routing
Answer: C

84. LAN uses which addressing?
A) Logical
B) Hierarchical
C) Physical
D) Port
Answer: C

85. Which is not a layer in the OSI model?
A) Application
B) Presentation
C) Network
D) Session Link
Answer: D

Specialized IP Versioning and Concepts

86. Which protocol is used to exchange routing information among routers?
A) SNMP

B) BGP
C) FTP
D) SMTP
Answer: B

87. The port number for SMTP is:
A) 25
B) 23
C) 53
D) 110
Answer: A

88. Dynamic address assignment is a function of:
A) DNS
B) DHCP
C) TCP
D) IP
Answer: B

89. Which one is not an OSI layer?
A) Process
B) Session
C) Presentation
D) Application
Answer: A

90. Data encapsulation on sending computer is done in which order (from top to bottom)?
A) Application, Presentation, Session, Transport, Network, Data Link, Physical
B) Physical, Data Link, Network, Transport, Session, Presentation, Application
C) Network, Data Link, Physical, Application, Presentation, Session, Transport
D) Application, Session, Presentation, Transport, Data Link, Network, Physical
Answer: A

Application-oriented and User-level Questions

91. The layer for e-mail services in OSI:
A) Session
B) Application
C) Network
D) Presentation
Answer: B

92. Which layer has “service access points” (SAPs)?
A) Data Link
B) Session
C) Presentation
D) Transport
Answer: D

93. End-to-end error recovery is done at which layer?
A) Transport

B) Network
C) Physical
D) Data Link
Answer: A

94. SNMP works at which layer?
A) Application
B) Network
C) Transport
D) Data Link
Answer: A

95. DNS stands for?
A) Domain Numbering System
B) Domain Name System
C) Domain Naming Scheme
D) Distributed Network System
Answer: B

Address Format and Translation

96. Which OSI layer uses MAC addresses?
A) Network
B) Transport
C) Data Link
D) Physical
Answer: C

97. Which layer is responsible for session checkpointing and recovery?
A) Transport
B) Session
C) Presentation
D) Application
Answer: B

98. At which layer does IP exist?
A) Application
B) Session
C) Network
D) Data Link
Answer: C

99. Which of the following is NOT a function of the network layer?
A) Routing
B) Logical addressing
C) Physical addressing
D) Congestion control
Answer: C

100. Layer that provides independence to upper layers from data transmission/representation:

A) Application
B) Network
C) Presentation
D) Session
Answer: C

These MCQs cover all key aspects of network models, especially the OSI and TCP/IP reference models, and address requirements for deep exam preparation. Let me know if you need detailed answers, explanations, or specific subtopic MCQs.examradar+1

Add to follow-up

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