Viva Questions with Answers (Program 4–10 + General CN Viva)

1. What are functions of different layers?

Each layer provides specific services like physical transmission, framing, routing, end-to-end delivery, encryption, and application support.

2. Differentiate between TCP/IP Layers and OSI Layers.

OSI has 7 layers; TCP/IP has 4. OSI is theoretical; TCP/IP is practical and used in real networks.

3. Why is header required?

Headers carry control info like addressing, sequencing, error checking.

4. What is the use of adding header and trailer to frames?

To provide start/end indication, error detection, and addressing.

5. What is encapsulation?

Wrapping data with protocol information as it moves down the OSI layers.

6. Why fragmentation is required?

To break large packets into smaller units that fit MTU size.

7. What is MTU?

Maximum Transmission Unit: maximum size of a frame that can be sent.

8. Which layer imposes MTU?

Data Link Layer.

9. Flow control vs Congestion control.

Flow control prevents receiver overflow; congestion control prevents network overload.

10. Point-to-Point vs End-to-End connection.

Point-to-point is between two nodes; end-to-end is between source and final destination.

11. Protocols in different layers?

Physical: Ethernet
Data Link: MAC
Network: IP
Transport: TCP/UDP
Application: HTTP, FTP etc.

12. What is Protocol Stack?

Collection of protocols working together in layers.

13. Difference between TCP and UDP.

TCP: Reliable, connection-oriented
UDP: Fast, connectionless, no reliability

14. Connectionless vs Connection-oriented.

Connection-oriented needs a session (TCP), connectionless sends independent packets (UDP).

15. Why frame sorting required?

To maintain sequence and prevent out-of-order delivery.

16. What is subnet?

Logical subdivision of a network.

17. What is Gateway?

A gateway connects different networks and protocols.

18. What is an IP address?

Unique address for identifying a device in a network.

19. What is MAC address?

Hardware address permanently assigned to NIC.

20. Why IP address required when MAC is present?

MAC works only in local network; IP is required for global routing.

21. What is a port?

Logical endpoint used to identify application processes.

22. What are ephemeral and well-known ports?

Well-known: 0–1023
Ephemeral: temporary ports (49152–65535)

23. What is a socket?

Combination of IP + Port used for communication.

24. Parameters of socket()?

Domain, type, protocol.

25. Describe bind(), listen(), accept(), connect(), send(), recv().

bind() → Assigns address
listen() → Waits for connections
accept() → Accepts client request
connect() → Client connect request
send()/recv() → Data transmission

26. What are system calls?

Functions used to request OS services (open, read, write, fork, exec).

27. What is IPC? Name techniques.

Inter-process communication: Pipes, Shared Memory, Message Queues.

28. Explain mkfifo(), open(), close().

mkfifo() creates FIFO; open() opens file; close() closes file.

29. What is file descriptor?

Integer ID that refers to opened files.

30. What is traffic shaping?

Controlling data flow to avoid congestion (Leaky/Token Bucket).

31. Types of congestion control algorithms?

Open-loop (prevention), Closed-loop (feedback).

32. Leaky bucket vs Token bucket.

Leaky: Constant output rate
Token: Allows bursty traffic

33. How do you implement leaky bucket?

Use queue + fixed processing rate + drop when full.

34. How do you generate bursty traffic?

Send packets at irregular/high rates.

35. Polynomial used in CRC-CCITT?

$x^{16} + x^{12} + x^5 + 1$ (0x1021)

36. Other error detection algorithms?

Parity, Checksum, Hamming Code.

37. Difference between CRC and Hamming code.

CRC detects errors; Hamming detects and corrects.

38. Why Hamming code is called 7,4 code?

7 bits total, 4 data bits, 3 parity bits.

39. Odd parity vs even parity.

Odd parity: total 1's = odd
Even parity: total 1's = even

40. What is syndrome?

Bit pattern indicating error position in Hamming Code.

41. What is generator matrix?

Matrix used to encode data in linear block codes.

42. What is spanning tree?

A tree covering all nodes without cycles.

43. Prim's vs Kruskal's algorithm.

Prim: grows tree from one node
Kruskal: picks smallest edges globally

44. What are routing algorithms?

Methods to find paths (Link-state, Distance-vector).

45. Classification of routing algorithms.

Static and Dynamic routing.

46. Drawbacks of distance vector algorithm.

Slow convergence, count-to-infinity.

47. How routers update distances?

By exchanging distance vectors with neighbors.

48. How to overcome count-to-infinity?

Split horizon, poisoned reverse.

49. What is cryptography?

Technique of securing data through encoding.

50. Types of cryptographic algorithms?

Symmetric and Asymmetric.

51. What is public key?

Key used for encryption, shared publicly.

52. What is private key?

Key used for decryption, kept secret.

53. What are key, ciphertext, plaintext?

Plaintext = original data
Ciphertext = encrypted data
Key = encryption/decryption parameter

54. What is simulation?

Virtual execution of network behavior using tools like NS2.

55. Advantages of simulation?

Cheap, repeatable, easy to modify.

56. Simulation vs Emulation.

Simulation is virtual; emulation mimics real hardware.

57. What is a router?

Device that forwards packets between networks.

58. What is a bridge?

Connects two LAN segments.

59. What is a switch?

Connects devices within LAN using MAC table.

60. What is a hub?

Broadcasts data to all ports; no intelligence.

61. Difference between router, bridge, switch, hub.

Router (IP routing), Switch (MAC), Bridge (segment), Hub (broadcast).

62. What is ping and telnet?

Ping tests connectivity; Telnet provides remote login.

63. What is FTP?

File Transfer Protocol.

64. What is BER?

Bit Error Rate.

65. What is congestion window?

TCP variable controlling how many bytes can be sent.

66. What is BSS?

Basic Service Set in Wi-Fi networks.

67. Incoming vs outgoing throughput?

Incoming: received data rate
Outgoing: sent data rate

68. What is collision?

Two nodes transmitting at same time on shared medium.

69. How to generate multiple traffics?

Create multiple source-destination flows in NS2.

70. How to setup Ethernet LAN?

Using nodes, duplex links, queue, and LAN creation commands.

71. What is meant by mobile host?

A mobile host is a device (like a smartphone or laptop) that can change its network location while maintaining ongoing communication.

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72. What is meant by NCTUns?

NCTUns (National Chiao Tung University Network Simulator) is a high-speed, accurate network and traffic simulator/emulator used for wired, wireless, mobile, and vehicular networks.

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73. What are dispatcher, coordinator, and NCTUns client?

- Dispatcher – Starts and manages NCTUns simulation processes.
- Coordinator – Controls simulation events, time synchronization, and communication among modules.

- NCTUns Client – User interface used to design, configure, and run simulation scenarios.

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74. Name few other Network simulators.

NS2, NS3, OMNeT++, OPNET, QualNet, Mininet, GNS3.

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75. Differentiate between logical and physical address.

- Logical Address – IP address; used for identifying a device globally.

- Physical Address – MAC address; used for communication within a local network.

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76. Which address gets affected if a system moves from one place to another?

Logical address (IP address) changes when the network changes.
MAC address remains the same.

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77. What is ICMP? What are its uses? Name few.

ICMP (Internet Control Message Protocol) is used for error reporting and network diagnostics.
Uses:

- Ping (Echo Request/Reply)

- Destination Unreachable

- Time Exceeded

- Redirect messages

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78. Which layer implements security for data?

Presentation Layer handles encryption/decryption.
Transport Layer (TLS/SSL) also implements end-to-end security.