

SAMPLE PAPERS**DIPLOMA THIRD SEMESTER EXAMINATION 2025 (JUT)****COMPUTER NETWORKS****DIPLOMA WALLAH**

- **Time:** 3 Hours
- **Full Marks:** 70
- **Instructions:** Answer any **FIVE** questions. **Question No. 1 is Compulsory.**

1. Choose the correct alternative of the following: (2 * 7 = 14)

(i) The number of layers in the ISO-OSI reference model is:

- (a) 4
- (b) 5
- (c) 7
- (d) 6

(ii) Which command is used to test the reachability of a host on an Internet Protocol (IP) network?

- (a) ipconfig
- (b) ping
- (c) netstat
- (d) nslookup

(iii) In which transmission mode can data be sent and received simultaneously?

- (a) Simplex
- (b) Half-Duplex
- (c) Full-Duplex
- (d) Multiplex

(iv) The connector used with UTP (Unshielded Twisted Pair) cable is:

- (a) BNC
- (b) RJ-45
- (c) RJ-11
- (d) SC

(v) Which of the following is an example of an unguided transmission medium?

- (a) Optical Fiber
- (b) Coaxial Cable

(c) Radio Waves

(d) Twisted Pair

(vi) The port number used by HTTP is:

(a) 21

(b) 25

(c) 80

(d) 443

(vii) Which layer determines the interface of the system with the user?

(a) Network

(b) Application

(c) Session

(d) Physical

2.

(a) Explain the OSI Reference Model with a neat diagram. Discuss the function and responsibility of each layer. (7)

(b) Explain the various causes of Transmission Impairment: Attenuation, Distortion, and Noise. What remedies can be used to reduce them? (7)

3.

(a) Describe various Network Topologies (Star, Bus, Ring, Mesh) with neat diagrams. Discuss their advantages and disadvantages. (7)

(b) Differentiate between Analog Signals and Digital Signals. (7)

4.

(a) Explain IPv4 Addressing. Describe IP Classes (A, B, C) and the rules for grouping IP addresses. (7)

(b) Explain the need for Subnetting and CIDR. (7)

5.

(a) Explain the TCP/IP Networking Model with a neat diagram. (7)

(b) Compare the TCP/IP Model and OSI Model in detail. (7)

6.

(a) What is DHCP? Explain how a DHCP Server assigns IP addresses. (7)

(b) Differentiate between a Hub and a Switch based on collision and broadcast domains. (7)

7. Write short notes on any four: (3.5 * 4 = 14)

(a) DNS

(b) VLAN

(c) SMTP

(d) NAT

(e) ARP



SOLUTIONS — PAPER 1

Q1. MCQ Answers:

- (i) (c) 7
- (ii) (b) ping
- (iii) (c) Full-Duplex
- (iv) (b) RJ-45
- (v) (c) Radio Waves
- (vi) (c) 80
- (vii) (b) Application

Q2-Q6 Model Answers (Summary):

- **Q2(a) OSI Model:** Draw 7 layers (Physical to Application). Explain functions: Physical (bits), Data Link (frames/MAC), Network (packets/routing), Transport (end-to-end/reliability), Session (dialog control), Presentation (encryption/compression), Application (user services). ¹
- **Q2(b) Impairment:** Define Attenuation (loss of energy), Distortion (change in wave shape), Noise (external signals). Remedies: Amplifiers for attenuation, shielding/digital encoding for noise. ²
- **Q3(a) Topologies:** Draw Star (hub center), Bus (backbone cable), Ring (circular token), Mesh (point-to-point). **Advantages:** Star (easy troubleshoot), Mesh (reliable). **Disadvantages:** Bus (cable break stops all), Ring (one fail stops all). ³
- **Q3(b) Analog vs Digital:** Analog: Continuous wave (Sine), prone to noise. Digital: Discrete (0s and 1s), Square wave, less prone to noise. ⁴
- **Q4(a) IPv4:** 32-bit address. Classes: A (0-127, large nets), B (128-191, medium), C (192-223, small). Rules: Network ID vs Host ID parts. ⁵
- **Q4(b) Subnetting:** Splitting a large network into smaller sub-networks. **CIDR:** Classless Inter-Domain Routing (uses /notation) to reduce IP waste. ⁶
- **Q5(a) TCP/IP:** Draw 4/5 layers: Application, Transport, Internet, Network Access. Explain protocols at each (HTTP, TCP, IP, Ethernet). ⁷
- **Q5(b) Comparison:** OSI (7 layers, theoretical, distinct Presentation/Session). TCP/IP (4/5 layers, practical standard, combines top 3 layers of OSI). ⁸
- **Q6(a) DHCP:** Dynamic Host Configuration Protocol. Automates IP assignment. DORA process (Discover, Offer, Request, Acknowledge). ⁹
- **Q6(b) Hub vs Switch:** **Hub:** Layer 1, broadcasts to all, single collision domain. **Switch:** Layer 2, unicast based on MAC, separate collision domains per port. ¹⁰

Q7 Short Notes:

- **DNS:** Domain Name System. Translates names (www.google.com) to IPs (8.8.8.8).
- **VLAN:** Virtual LAN. Logically separates networks on the same switch for security and traffic control.
- **SMTP:** Simple Mail Transfer Protocol. Used for **sending** emails between servers.

- **NAT:** Network Address Translation. Converts Private IPs to Public IPs to save address space.
- **ARP:** Address Resolution Protocol. Maps IP address to MAC address.

