COMMUNICATIONS   PAPER 3

Section A

1) How does carrier sense multiple access with collision detection (CSMA/CD) improve network performance?
2) Explain the security implications of using thin clients in a business network.
3) How can subnetting improve the efficiency of a large network?
4) Describe the process of encoding and decoding video files for real-time streaming.
5) How can data loss prevention techniques be implemented in cloud storage?
6) What are the risks of data packet collisions in a highly congested network?
7) How does signal attenuation impact the performance of a wide area network (WAN)?
8) What are the advantages and disadvantages of using IPv6 over IPv4?
9) Explain how DNS attacks can compromise network security.
10) How does encryption work in securing wireless communication channels?
11) Explain the process of dynamic routing in large networks.
12) What role does cloud redundancy play in disaster recovery?
13) Compare and contrast different topologies for large-scale WANs.
14) How does signal amplification through repeaters affect long-distance wireless communication?
15) Explain how bit rate affects video quality in streaming services.
16) How does the use of fibre optics reduce the risks of electromagnetic interference in networks?
17) What are the limitations of using public cloud services for sensitive data?
18) Describe how multi-layer security protocols protect data in cloud computing.
19) How do mesh networks handle node failures?
20) What factors influence the design of hybrid networks in a corporate setting?
21) How do domain name system (DNS) attacks affect the stability of the internet?
22) What is the impact of high traffic volume on the performance of client-server networks?
23) Explain how packet filtering firewalls manage data flow in a secure network.
24) How does VLAN (virtual LAN) segmentation improve network security?
25) Explain the differences between static and dynamic IP addressing in large-scale networks.
26) What role do switches play in reducing network congestion in Ethernet?

27) How can traffic shaping improve the performance of a WAN?

28) Describe the role of routing tables in determining the best path for data packets.

29) What are the risks associated with bit streaming in unsecured networks?

30) Explain the importance of data compression in bit streaming.

31) How does the quality of service (QoS) improve network performance in real-time applications?

32) Explain how digital certificates authenticate devices in secure networks.

33) How does network virtualization help optimize cloud-based systems?

34) What are the challenges of integrating cloud services with existing network infrastructure?

35) Explain how firewalls prevent unauthorized access in a multi-layered network.

36) How can network administrators mitigate the risks of DDoS attacks on cloud infrastructure?

37) What are the key differences between network address translation (NAT) and port forwarding?

38) How does a VPN (virtual private network) secure data transmission over public networks?

39) How do quantum computing threats impact the security of current encryption methods?

40) What are the challenges of implementing IPv6 in legacy networks?

41) Explain how machine learning algorithms can improve network security.

42) What role does edge computing play in enhancing cloud-based systems?

43) How does MPLS (Multiprotocol Label Switching) improve the efficiency of data transmission in WANs?

44) What is the impact of latency on the performance of real-time video streaming?

45) How do content delivery networks (CDNs) improve the speed of data transmission for global users?

46) Explain how blockchain technology can enhance security in cloud storage systems.

47) How does deep packet inspection help detect malicious traffic in a network?

48) What are the security risks of using open Wi-Fi networks in public spaces?

49) Explain the process of migrating data from local servers to cloud infrastructure.

50) How do smart contracts ensure the integrity of cloud-based transactions?

Section B

1) Calculate the checksum value for a given binary packet and explain how it's used.
2) Design a network topology that optimizes packet switching.
3) Explain how SCTP offers benefits over TCP and UDP in certain applications.
4) How would you resolve IP conflicts in a large corporate network?
5) Describe how end-to-end communication works in the TCP/IP model.
6) What are the implications of packet fragmentation in real-time data streams?
7) Design an algorithm that implements dynamic packet routing.
8) How does error detection differ in TCP and UDP protocols?
9) Compare and contrast IPv4 and IPv6 in terms of packet structure.
10) Explain how BitTorrent handles large files and prevents data loss.
11) How do ACK flags in TCP/IP help prevent packet loss?
12) What are the challenges of address resolution protocols in dynamic networks?
13) Explain how hop number limits help manage packet congestion.
14) Design a protocol to optimize bandwidth usage in a packet-switched network.
15) How do VLANs improve security in large corporate networks?
16) Analyze the advantages and disadvantages of using IPv6 over IPv4.
17) Explain how WiMax protocols ensure data integrity over long distances.
18) What is the impact of congestion control algorithms on network performance?
19) How does the three-way handshake ensure reliable communication in TCP?
20) Create a diagram that shows how packet headers are used in routing tables.
21) Analyze the effect of network latency on VoIP and real-time communication.
22) How does packet reassembly affect video streaming quality?
23) What are the trade-offs between bandwidth and latency in circuit switching?
24) How can packet-switched networks handle large-scale video conferencing?
25) Explain how dynamic IP addressing works in a large network.
26) Analyze how TCP handles congestion during high-volume data transmission.
27) Describe the end-to-end delay in packet-switched networks.
28) Explain the benefits of SCTP over TCP in certain real-time applications.
29) How does fragmentation affect data integrity in video streaming?
30) Discuss the benefits and drawbacks of distributed routing algorithms.

31) How does checksum validation improve the reliability of packet transmission?
32) Analyze how packet loss impacts real-time audio and video communication.
33) Create a model to simulate packet loss and re-transmission in a network.
34) Describe how WiFi collision avoidance ensures smooth transmission in congested networks.
35) Explain how VLANs impact the scalability of Ethernet networks.
36) What are the key challenges in designing routing algorithms for packet-switched networks?
37) How can QoS (Quality of Service) be implemented in a TCP/IP network?
38) Create a diagram showing the process of fragmentation and reassembly in packet-switched networks.
39) Explain the significance of MAC addresses in the data-link layer.
40) Analyze the security risks of packet switching in a peer-to-peer network.
41) What is the impact of network jitter on real-time applications like VoIP?
42) Explain how priority-based packet routing can optimize video streaming performance.
43) How does TCP/IP packet fragmentation affect network performance in low-bandwidth networks?
44) Discuss the challenges in implementing IPv6 in existing IPv4-based networks.
45) What are the performance trade-offs between circuit switching and packet switching in real-time applications?
46) How can network congestion be reduced using dynamic routing protocols?
47) Create an algorithm that improves the efficiency of packet reassembly.
48) Explain the impact of CSMA/CA in maintaining WiFi network performance.
49) How does packet priority work in multimedia streaming applications?
50) Discuss the future of TCP/IP protocols with the advent of 5G networks.