

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2083 Baishakh

Exam.	Back	
Level	BE	Full Marks 80
Programme	BEI	Pass Marks 32
Year / Part	III / I	Time 3 hrs.

Subject: - Computer Network (CT 613)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.



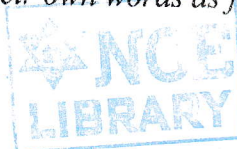
1. What are protocol suites? Discuss each in TCP/IP model. Explain xDSL family in telecom network. [4+4]
2. Compare circuit switching and packet switching. Describe FDM and TDM hierarchies in block. [4+4]
3. In GoBack4 (GB4) ARQ if every 6th packet is lost and if we have to send 10 packets, then how many transmissions are required? What could be the total transmission in selective repeat (SR)? [2+6]
4. Compare the IPv4 header fields and function with neat diagram. List the extension header ordering. [6+2]
5. Suppose a company has an IP address on 150.10.0.0 having 6 departments containing 2020, 50, 507, 1010, 225, and 58 hosts. As a network engineer, design an IP plan for the network using VLSM. List out the CIDR, subnet mask, network ID, broadcast ID usable host IP ranges and wasted IP address for each department. [8]
6. How connection is established and released in TCP? How congestions can be handled using token bucket? Explain with proper diagram. [3+5]
7. Explain the use of packet tracer. Explain the types of DNS queries with examples of www.google.com. [2+6]
8. Explain the IPv4 to IPv6 tunneling transition with their IPv6 address format. [2+6]
9. Describe CIA of security principle. Encrypt a word "hacker" using RSA algorithm. [2+6]
10. Write short notes on: (Any Two) [2×4]
 - a) RFC
 - b) Addressing format in IPv6
 - c) AES
 - d) VPN

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1. What is RFC? Discuss the issues in the layer design. Compare OSI and TCP/IP Model with its protocol suites. [2+2+4]
2. What are the delays in communication? Explain TDM, FDM, and WDM in brief. [2+6]
3. Explain viterbi algorithm for error detection in data link layer for the received encoded bits sequence: 10 01 11 00. Calculate CRC for $M(x) = x^6 + x^4 + 1$ and generator is $N(x) = x^3 + 1$. [4+4]
4. What is classful and classless routing protocols? Explain distance vector routing with example. [3+5]
5. Suppose a company has an IP address on 150.10.0.0 having 6 departments containing 107, 60, 505, 1010, 225, and 45 hosts. As a network engineer, design an IP plan for the network using VLSM. List out the CIDR, subnet mask, network ID, broadcast ID usable host IP ranges and wasted IP address for each department. [8]
6. Discuss port and socket addressing with diagram. Explain transmission control protocol along with its header format. [4+4]
7. What do you mean by proxy server? Explain working principle of iterative DNS query with www.facebook.com. [2+6]
8. What are the features of IPv6 header? Explain IPv4 to IPv6 transition mechanism in brief. [2+6]
9. Describe CIA of security principle. Encrypt a word "virus" using RSA algorithm.. [3+5]
10. Write short notes on: (Any Two) [2×4]
 - a) vLANs
 - b) Compare POP3 and IMAP
 - c) Neighbor Discovery ICMPv6 Message types
 - d) Firewall

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1. What is protocol? What are the reasons for using layered protocols? Compare Open System Interconnection (OSI) with TCP/IP model. [1+2+5]
2. Compare circuit switching and packet switching. Explain about any three guided media in detail. [2+6]
3. Explain byte and bit stuffing framing technique. Explain CRC with example. [2+2+4]
4. What are routed and routing protocols? Differentiate between distance vector and link state routing protocol. How to elect DR in OSPF routing? Explain. [2+2+4]
5. What is private IP address? In an organization there are 4 departments: HR with 6 computers, admin with 25 computers, finance with 3 computers and sales with 55 computers. If one of the hosts has an IP of 202.100.20.71/27, perform subnetting with minimum IP wastage and determine in which subnet the given host belongs. [2+6]
6. Explain the fundamentals of socket programming with respect to client/server socket communication. How is token bucket algorithm better than leaky bucket algorithm? Explain. [4+4]
7. Explain the working principle of DNS system with proper diagram. What are the protocols used in e-mail? Explain. [2+6]
8. What is the significance of extension header in IPv6? Explain dual stack transition mechanism with suitable diagram. [2+6]
9. What is public key cryptography? Use RSA algorithm to encrypt and decrypt the message "information". [2+6]
10. Write Short notes on:(Any Two) [2×4]
 - a) Frame Relay Virtual Circuit Switching
 - b) Firewall and their types
 - c) 802.4 Token Bus
 - d) IPv6 multicast addressing format

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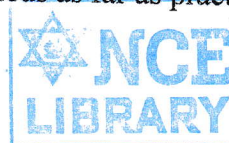
1. How data encapsulation occurs in different layers of OSI model? Critically compare P2P with client server model. [4+4]
2. A network with bandwidth of 20 Mbps can pass only an average of 18,000 frames per minute with each frame carrying an average of 30,000 bits. What is the throughput of this network? Explain the guided transmission media that is most commonly used for LAN in home and offices. [3+5]
3. What are the functions of data link layer? How “Go back N ARQ” and “Selective repeat request” techniques are used for frame retransmission? [2+6]
4. What do you mean by adaptive routing? Explain OSPF protocol operation with states to reach to fully adjacency state. [2+6]
5. Design a network for a company having 7 subnets with 6, 14, 24, 30, 60 and 42 hosts. Determine the subnet mask, network address, broadcast address, usable host range. Choose IP address from the pool of class C. [8]
6. Why do we need a transport layer? Draw the segment structure of UDP. How does it differ from TCP? Explain. [4+4]
7. Explain FTP working principle with its types. [8]
8. What are the features of IPv6 addressing? Explain the strategies used for transition from IPv4 to IPv6. [2+6]
9. What is the difference between Symmetric and Asymmetric Key cryptography? Encrypt the plain text “WORLD” using RSA algorithm. [2+6]
10. Write Short notes on:(Any Two) [2×4]
 - a) Congestion control and Token Bucket traffic shaping technique
 - b) VPN
 - c) 802.3 CSMA-CD
 - d) PGP services

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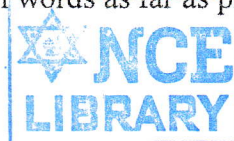
1. Discuss Client-Server model and Peer-to-Peer model. Compare TCP/IP model with OSI reference model. [4+4]
2. What are the factors to be considered while selecting transmission media? Explain optical fiber cable in detail with its advantages and disadvantages. [2+6]
3. Compare Flag byte with byte stuffing and bit stuffing in Framing. Detect the error (if any) using CRC, if received frame is 0101101101 and generator polynomial is 1001. [2+6]
4. What are the criteria for good routing? Explain the general operation of RIP with timers. [2+6]
5. What is the Network address and broadcast address in IPv4 addressing? How do you assign the sub-net IP addresses to three LANs each 12,5 and 29 computers respectively? (Assume 202.35.91.32/25). [2+6]
6. Why do we need a transport layer? Draw the segment of UDP. Compare TCP with UDP. [2+2+4]
7. Draw the architecture of Email Agent. Why is DNS distributive in nature? Explain iterative query vs recursive query of DNS with examples and diagrams. [2+6]
8. Discuss any-cast and multi cast addresses in IPv6 with use cases. If there are IPv4 networks in between two IPv6 endpoints, what type of transition strategies will you suggest? Explain with examples and diagrams. [2+6]
9. What is IPSEC? Encrypt the plain text "MACHINE" using RSA algorithm. [2+6]
10. Write short notes on (Any Two) [2×4]
 - a) HTTP methods
 - b) VPN
 - c) IDS.
 - d) Token bucket Algorithm

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1. Why do you need layering? How does P2P works? Explain. [2+6]
2. Discuss briefly Delay, Bandwidth and MAC address. Discuss how data or packets goes through switch to switch in Frame Relay Virtual-circuit network. [3+5]
3. What are the services provided by data link layer? How CRC can be used to detect error? Explain with an example. [2+6]
4. Explain the Flooding algorithm with ways to minimize the duplication of packets. Write down steps for Link State Routing Protocol. [4+4]
5. What is private IP address? Company Allegro hired an IT expert. The expert was given task to perform logical design of the company with an IP block of 206.100.100.0/24. The company had 40,20,8,100 and 5 employees in its sales, admin, finance, support and HR departments respectively. Show how he was able to perform subnetting with minimum IP wastage. [2+6]
6. Discuss how multiplexing and de-multiplexing is achieved in Transport layer with examples. How is token bucket algorithm better than Leaky bucket in context with packet loss? Explain. [4+4]
7. Why is HTTPS not used for all web traffic? How FTP works? Explain. [2+6]
8. How extension header is used in IPV6 ? Explain dual stack transition mechanism from IPV4 to IPV6. [3+5]
9. Draw the block diagram of DES algorithm. Explain RSA with examples. [3+5]
10. Write short notes on: (Any Two) [2×4]
 - a) Deffie Hellman Algorithm
 - b) PGP
 - c) ATM
 - d) 802.3 CSMA.

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1. What is data encapsulation? Explain OSI reference model with suitable diagram. [2+6]
2. Define Throughput and Delay. Compare different types of guided transmission media with appropriate figures. [2+6]
3. Explain Selective repeat and Go back N ARQ with example. A bit string 011011101111111011111110 needs to be transmitted with flag 7E at the data link layer. What is the string actually transmitted after bit stuffing? [6+2]
4. Why are different inter-AS and intra-AS protocols used in the internet? Compare and contrast link state and distance vector routing algorithms. [2+6]
5. Design a network for a company having 5 departments with 60, 42, 30, 10 and 12 hosts. Specify the network address, valid host range, broadcast address and subnet mask for each department from the given address 202.17.11.0/24. [10]
6. What are the differences between TCP and UDP? How do you implement packet congestion Control for better QOS? [4+4]
7. What is port address and socket address? Explain working principle of E-mail system with a proper diagram. [2+6]
8. What are the features of IPv6 header. Explain the strategies used for transition from IPv4 to IPv6. [3+5]
9. When can you say your network is compromised? And, how is it caused? How can you make your network secure using public key cryptography? [2+2+4]
10. Write short notes on: (Any Two) [2×3]
 - a) X25 Network
 - b) DHCP
 - c) ALOHA

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1. Why layering is important? Explain Open System Interconnection (OSI) model and compare OSI with TCP/IP reference model. [2+6]
2. What are the factors to be considered while selecting media? Differentiate between datagram switching and virtual circuit switching approach. [2+6]
3. What are the services provided by data link layer? How does CSMA/CA protocol work to avoid the collision during hidden station problem? Explain with diagram. [2+4+2]
4. Suppose an ISP has 200, 250, 500 and 100 customers in the four different places say, A, B, C and D and need four point-to-point links. Provided an IP 10.0.48.0/21, you are required to perform subnetting with minimum waste of IP. Find out the subnet masks, network address, broadcast address, usable IP range and unusable IP range for each location. [10]
5. Define unicast and multicast routing. Compare distance vector and link state routing protocols with example. [2+6]
6. What is significance of port address? Discuss about different classes of port addresses defined by IANA. How can traffic congestion controlled by token Bucket method? [1+3+4]
7. What is DNS? Explain the working principle of DNS with a proper diagram. Compare IMAP and POP3 protocols. [1+4+3]
8. What are the factors that lead to the deployment of IPv6? Explain briefly about the process involved in transition of IPv4 to IPv6. [2+6]
9. What are the properties of secure communication? Encrypt and decrypt the message "BEIE" using RSA algorithm. [2+6]
10. Write short notes on: (Any Two) [2×3]
 - a) Go back N ARQ
 - b) Virtual circuit switching
 - c) CRC
