Roll No. _____ Name _____ Group _____

Thapar Institute of Engineering & Technology
Computer Science & Engineering Department
QUIZ-1

UCS414: Computer Network **24 Feb 2025** **Time: 20 Minutes** **MM:10**
Faculty: Dr. Lokendra Vishwakarma

Instructions: 1. Assume missing data, if any, suitably. **2.** Write the correct option in the box ONLY. Answers not marked in the boxes, will not be evaluated. **3.** Overwritten answers will not be entertained. **4.** In case you think no option is correct, write option E.

1	2	3	4	5	6	7	8	9	10	11	12
B	C	C	B	A	C	C	C	...	D	...	...

1. **Which device operates at the Data Link Layer of the OSI model?** [0.5]
A. Router B. Switch C. Firewall D. Repeater

2. **The subnet mask 255.255.255.0 corresponds to which CIDR notation?** [0.5]
A. /8 B. /16 c./24 /20

3. **The One-Bit Sliding Window Protocol is mainly used in which ARQ mechanism?** [0.5]
A. Go-Back-N B. Selective Repeat C. Stop-and-Wait D. Frame Relay

4. **Which ARQ protocol retransmits all frames from an error onwards?** [0.5]
A. Stop-and-Wait B. Go-Back-N C. Selective Repeat D. None of the above

5. **What is the purpose of the ICMP protocol?** [0.5]
A. Error reporting and diagnostics B. Data encryption
C. Routing table updates D. File transfer

6. **Which ICMP message type is used for the *ping* command?** [0.5]
A. Type 0 (Echo Reply) B. Type 3 (Destination Unreachable)
C. Type 8 (Echo Request) D. Type 11 (Time Exceeded)

7. **What does an ICMP "Time Exceeded" message indicate?** [0.5]
A. A successful packet transmission B. A routing table update
C. The TTL value of IPv4 packet reached 0 D. The destination port is closed

8. **Which field in the IPv4 header prevents infinite loops?** [0.5]
A. Identification B. Flags C. TTL D. Fragment Offset

9. **Consider a 128×10^3 bits/seconds satellite communication link with a one-way propagation delay of 150 milliseconds. Selective retransmission (repeat) protocol is used on this link to send data with a frame size of 1 kilobyte. Neglect the transmission time of acknowledgment. The minimum number of bits required for the sequence number field to achieve 100 percent utilization is .....** [2]
Answer:
Given Data:
Bandwidth: $128 * 10^3$bps | Propagation Delay: 150ms = 0.15s | Frame Size: 1KB = 8000 bits
Tranmission time:

$$\frac{8000}{128 * 10^3} = 0.0625sec$$

Round Trip Time (RTT): $2 * 0.15 = 0.3$ sec
Window Size:

$$\frac{RTT}{\text{Frame Transmission Time}} = \frac{0.3}{0.0625} = 4.8 = 5$$

Bits Required for Sequence Number:
$2^n >= W + 1 \longrightarrow 2^n >= 6$
n=3

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10. **Suppose computers A and B have IP addresses 10.105.1.113 and 10.105.1.91 respectively, and they both use the same netmask N. Which of the following values of N should not be used if A and B should belong to the same network?** [1]

A. 255.255.255.0 B. 255.255.255.128 C. 255.255.255.192 D. 255.255.255.224

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11. **You are given the IP address 192.168.10.64/26. Answer the following: 1. How many total addresses are available in this subnet? 2.What is the first address in this subnet? 3. What is the last address in this subnet?** [0.5+0.5+0.5=1.5] **Answer:**
1. How many total addresses are available in this subnet?
Number of host bits: 32 - 26 = 6, So total addresses = 2^6= 64 addresses
2. What is the first address in this subnet?
With /26, each subnet has 64 addresses. So, 192.168.10.64/26 is the start of the second block.
3. What is the last address in this subnet?
If the subset starts at 192.168.10.64, and there are 64 addresses total, the last address will be:
192.168.10.64+64-1 = 192.168.127

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12. **A Token Ring network operates at a speed of 16 Mbps and has a total of 20 stations connected in a circular topology. The ring latency (the time taken for a token to complete one full loop in the ring when the network is idle) is measured as 40 microseconds. 1. What is the total time required for the token to complete one full rotation in the ring (token circulation time) when the network is idle? 2. If the frame size is 1024 bytes, what is the transmission time for one frame?** [0.5+1=1.5] **Answer:**
1. Ring latency = 40 microseconds
This is the time it takes for the token to circulate the full ring when idle, that is no data transmission delays. So, Answer is $40\mu sec = 40 \times 10^{-6} sec$
2. Frame size = 1024 bytes = 1024 x 8 = 8192 bits.
Transmission speed = 16 Mbps = 16×10^6
Using the formula:

$$\text{Transmission Time} = \frac{\text{Frame Size (in bits)}}{\text{Data rate (in bps)}}$$
$$= \frac{8192}{10 \times 10^6} = 512\mu sec$$
