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**Sample Question Format**

**KIIT Deemed to be University**

**Online Mid Semester Examination(Spring Semester-2024)**

**Subject Name & Code:** High Speed Networks (CS 4002) **Applicable to Courses: B. Tech(8th Sem Hons)**

**Full Marks=20** **Time: 90 minutes**

**SECTION-A(Answer All Questions. All questions carry 2 Marks)**

**(5×2=10 Marks)**

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| **Question No** | **Question Type(MCQ/SAT)** | **Question** | **Answer Key(if MCQ)** | **CO Mapping** |
| **Q.No:1(a)** | **MCQ** | In the transfer of file between server and client, if the transmission rates along the path is 10Mbps, 20Mbps, 30Mbps, 40Mbps. The throughput is usually \_\_\_\_\_\_\_\_\_\_\_. a) 20Mbps b) 10Mbps c) 40Mbps d) 50Mbps | b | CO1 |
|  | **MCQ** | Assume there is no congestion in a given network and the end-to-end delay is N \* (processing delay + transmission delay + propagation delay) . Find the number of intermediate nodes present between the source and destination. a) N/2 b) N c) N-1 d) 2N | c | CO1 |
|  | **MCQ** | Let us assume a packet is now transmitted in a network where no packet transmission happens earlier, then which of the following delays could be zero? a) Propagation delay b) Queuing delay c) Transmission delay d) Processing delay | b | CO1 |
|  | **MCQ** | Let us assume, the application process generates data faster than the network can process, as a consequence smaller data segments are sent over the network.   1. TRUE   b) FALSE | b | CO2 |
| **Q.No:1(b)** | **MCQ** | The value of acknowledgement field in a segment defines \_\_\_\_\_\_\_. a) sequence number of the byte received previously b) total number of bytes to receive c) sequence number of the next byte to be received d) sequence of zeros and ones | c | CO2 |
|  | **MCQ** | The receiver of the data controls the amount of data that are to be sent by the sender is referred to as \_\_\_\_\_\_\_\_\_\_\_. a) Flow control b) Error control c) Congestion control d) Error detection | a | CO2 |
|  | **MCQ** | Which of the following control fields in TCP header is used to specify whether the sender has no more data to transmit? a) FIN b) RST c) SYN d) PSH | a | CO2 |
|  | **MCQ** | Which of the following statements is correct?  a) Flow control occurs between sending application layer and receiving application layer.  b) Flow control occurs between receiving transport layer and receiving application layer.  c) Flow control occurs between sending transport layer and receiving transport layer.  d) All of these above | c | CO3 |
| **Q.No:1(c)** | **MCQ** | In the slow start phase of the TCP congestion control algorithm, the size of the congestion window a) does not increase b) increases linearly c) increases quadratically d) increases exponentially | d | CO2 |
|  | **MCQ** | The packet loss is detected at the sender using a timeout event. As a result, to handle the congestion TCP reduces the congestion window to its half.  a) TRUE  b) FALSE | b | CO3 |
|  | **MCQ** | In TCP, how many sequence numbers are consumed by an ACK packet carrying no data?   1. Zero 2. one 3. Any size 4. None of these above | a | CO2 |
|  | **MCQ** | What is the primary purpose of the TCP 'Persistence Timer'?   1. retransmit the last segment 2. prevent deadlock if a zero window size is advertised 3. time the duration in the TIME-WAIT state 4. periodically send ACKs in a long-lived connection | b | CO3 |
| **Q.No:1(d)** | **SAT** | The actual TCP header length in an IPv4 packet can vary from 20 to 60 bytes, where as it can not be possible to have a TCP header length of 38 bytes. Justify. |  | CO1 |
|  | **SAT** | The sequence number field in the TCP header is 32 bits long, which is big enough to cover over 4 billion bytes of data. Even if this many bytes were never transferred over a single connection, why might the sequence number still wrap around from (232 − 1) to 0? |  | CO3 |
|  | **SAT** | Let us assume the initial sequence number (ISN) used by both the TCP client and server are 100 and 1000 respectively. What will be the sequence number of the first data byte sent by the client to the server just after establishment of the connection? |  | CO3 |
|  | **SAT** | Does cumulative ACK supports bytes that are received out of order? Justify. |  | CO2 |
| **Q.No:1(e)** | **SAT** | In the TCP header, which field facilitates the delivery of the application data to the correct process. |  | CO1 |
|  | **SAT** | If the value of HLEN field is 1111, how many bytes of options are included in the TCP segment. |  | CO2 |
|  | **SAT** | In TCP, does a FIN segment close a connection in only one direction or both? justify. |  | CO2 |
|  | **SAT** | Consider a TCP client and a TCP server running on two different machines. After completing data transfer, the TCP client calls close to terminate the connection and a FIN segment is sent to the TCP server. Server-side TCP responds by sending an ACK which is received by the client-side TCP. As per the TCP connections state diagram, in which state does the client-side TCP connection wait for the FIN from the server-side TCP? |  | CO2 |

**SECTION-B(Answer Any One Question. Each Question carries 10 Marks)**

**(1×10=10 Marks)**

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| **Question No** | **Question** | **CO Mapping** |
| **Q.No:2** | 1. Discuss the need of 4-way handshake procedure for connection teardown. Describe the details of the messages exchanged during TCP 4-way handshaking in connection teardown. 2. The window size field in TCP is 16 bits long, that means the maximum window size can be of 65535 bytes. In real time data communication this maximum supported window size may not be sufficient. Discuss, how TCP deal with this situation to increase the window size. | CO1 & CO2 |
| **Q.No:3** | 1. Let us assume TCP uses a cumulative and delayed ACK scheme. The sender starts with a congestion window (Cwnd) of 1 MSS and currently is in slow start phase. The sender wants to sent 3 segments of 1 MSS each. The receiver sends 1 ACK for every two received segments. Calculate the value of Cwnd at the sender after receving ACK for all the 3 segments. 2. Let us assume, a source host is attached to a destination host via two routers. Show the detailed process of encapsulation and decapsulation happens from layer to layer throughout the communication of a packet from the source to the destination host. | CO1 & CO2 |
| **Q.No:4** | 1. During TCP connection teardown, which end point maintains the keep alive timer and discuss the need of this timer with a suitable example. 2. Distinguish between a time-out and 3-duplicate ACKs event. Which one is a stronger sign of congestion in the network? Explain the reason behind the same through an appropriate example. | CO2 & CO3 |
| **Q.No:5** | 1. The maximum payload of a TCP segment is 65,495 bytes. Explain, how this strange number has come up and what is it’s significance? 2. Discuss in detail, how the TCP Reno version handles the 3-duplicate ACK in a different way as compared to TCP Tahoe version that improves the performance of data transmission. | CO1 & CO2 |
| **Q.No:6** | 1. The ssthresh value for a Reno TCP station is set to 8 MSS. The station is now in the slow-start state with cwnd=5 MSS and ssthresh=8 MSS. Show the values of cwnd, ssthresh, and the current and the next state of the station after the following events: three consecutive non duplicate ACKs arrived, followed by five duplicate ACKs, followed by two nonduplicate ACKs, and followed by a timeout. 2. Show the sequence of message exchanges during the simultaneous open and simultaneous close operations of TCP along with the state changes occurs from time to time. | CO2 & CO3 |
| **Q.No:7** | 1. Discuss the different pointers used at both the sender and receiver in the TCP sliding window mechanism. Show the position of these pointers in the given scenario. The initial sequence number of client and server are 100 and 50 respectively. The buffer used at client and server for receiving the packets from other end are 250 and 300 respectively. After establishment of the connection, the client sends 100 bytes of data which is yet to be acknowledged. 2. What is the significance of maximum segment size (MSS) in TCP? Discuss in detail, how the MSS value between the TCP client and server is agreed upon during the connection establishment. | CO2 |

**Controller of Examinations**