MIDTERM EXAMINATION #2 – NOV. 6, 2013

COMPUTER NETWORKS : 03-60-367-01

UNIVERSITY OF WINDSOR

SCHOOL OF COMPUTER SCIENCE

Fall 2013 - 75 minutes

Examination Question Paper

NOTE: Students may take this question paper with them after the examination.

PLEASE READ CAREFULLY BEFORE YOU START

1. This is a CLOSED book test; no notes, textbooks, calculators or computer aids are allowed.
2. PRINT your NAME legibly and clearly with your Student ID in the space on the Scantron sheet. Use an HB pencil and carefully and thoroughly fill in the circle corresponding to the answer selection for each question.
3. You will be asked to sign your name once before leaving the exam room (sign-out).
4. PLACE ANSWERS on the Scantron sheet provided.
5. If you need more space for rough work you may use any additional space on the examination.
6. You are not allowed to give or receive unauthorized help with your test. Any misconduct, as outlined by the Senate bylaw 31 article I, will be reported accordingly.
7. You have **75 minutes** to complete this test.
8. Copies of the original Midterm examination answer sheets will be returned to students.
9. **This examination has a maximum of 65 marks.**

Good Luck!

All questions are either Multiple Choice or True-False. For each Multiple Choice question, you are to choose only one response which **best answers** the question. For True-False questions you may only choose one option (True or False). There may be up to five (5) response options for some questions. Place all answers on the Scantron sheet provided. The examination will be marked using the campus computer.

If an error is made you must carefully and completely erase your mistake and then indicate your choice of answer. Completely and carefully fill the circle that indicates your answer to each question. Make sure you have selected the correct question number on the Scantron sheet corresponding to the question on the examination question paper.

WARNING !

Read and think carefully about each question before answering.
Questions have been scrambled by topic. Keep your attention on your own test paper and answer sheet.

NOTATION: The following symbols are used in the examination.

GB – gigabyte (1024 MB)	**Gbps – gigabits per second**
MB – megabyte (1024 KB)	**KB – kilobyte (1024 B)**
B - 1 byte (8 b)	**b – bit**
m – metre	**km – kilometer (1000 m)**
Mbps – megabits per second	**kbps – kilobits per second (1024 b)**
km/s – kilometers per second	**msec – millisecond (1/1000 second)**

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1. Network layer protocols must be defined in every host and router.
   A) True
   B) False

2. Flow control is guaranteed to solve congestion problems.
   A) True
   B) False

3. Neither TCP nor UDP provide delay or bandwidth guarantees.
   A) True
   B) False

4. The IP service model is a _____ delivery service.
   A) guarantee
   B) reliable
   C) best-effort
   D) None of the options above is a valid response

5. A router is able to direct a message along its path by examining the destination IP address embedded within a UDP packet.
   A) True
   B) False

6. The IPv4 datagram header has length 20 bytes.
   A) True
   B) False

7. Datagram networks require call setup at the network layer.
   A) True
   B) False

8. Circuit switched networks require call setup at the network layer.
   A) True
   B) False

9. An "elastic" service is one that is capable of providing a range of service delivery adapted to available resources.
   A) True
   B) False

10. A packet belonging to a virtual circuit carries the destination address.
    A) True
    B) False

11. Before changing a local network IP address, it is necessary to advise the ISP of the changes.
    A) True
    B) False

12. The size of the TCP receive window (**`RcvWindow`**) changes throughout the duration of the connection.
    A) True
    B) False

13. The responsibility for managing localized needs for assigning IP addresses is given to internet service providers.
    A) True
    B) False

14. Transport protocols run in end systems.
    A) True
    B) False

15. Internet transport-layer protocols provide delay and bandwidth guarantees.
A) True
B) False

16. A router examines header fields in all IP datagrams passing through it.
A) True
B) False

17. ICMP messages are carried in IP datagrams.
A) True
B) False

18. IP fragmentation occurs due to different network link types with different maximum transfer units.
A) True
B) False

19. Assuming that two senders and two receivers are connected through a common router with an infinite buffer, it is possible for congestion to arise.
A) True
B) False

20. Network address translation satisfies the end-to-end argument for each layer to be peer-matched between sender and receiver.
A) True
B) False

21. In Virtual Circuits _____ .
A) it is required to allocate bandwidth and router buffers at call setup
B) every router on the source-destination path maintains "state" for each passing connection
C) each packet carries the destination host address
D) All of these responses are correct.

22. In order to establish a virtual connection (also called a virtual circuit) that permits datagrams to flow between communicating end hosts, it is necessary to _____ .
A) involve all intervening routers
B) initiate the connection using specialized datagrams that carry historical information about the end-end route
C) complete the connection using receiver and sender acknowledgements
D) All of the options above are correct responses

23. Router buffer sizes should be selected based on _____ .
A) message round-trip time (eg. as determined by acknowledgements)
B) link capacity
C) tolerance for data loss due to overflow
D) All of the options above are correct responses

24. The first item in an IP datagram is the _____ .
A) header length (in bytes)
B) total datagram length (in bytes)
C) protocol version number
D) type of service

25. In datagram networks _____ .
A) routers maintain state about end-to-end connections
B) packets are forwarded using destination host address and virtual circuit number
C) packets between the same source-destination pair may take different paths
D) None of these responses is correct.

26. Assuming that W is the maximum window size established by TCP "slow start", and the round-trip time is RTT, what is the average throughout of TCP as a function of W and RTT?
A) 0.5 x W/RTT
B) 0.5 x RTT/W
C) 0.75 x RTT/W
D) 0.75 x W/RTT

27. TCP flow control is provided by _____ .
A) including value of the receiver buffer available size in acknowledgements
B) keeping out-of-order segments in the receiver buffer
C) keeping the send rate always less than the receive rate
D) All of these responses are correct.

28. IP datagrams may be defragmented into several smaller IP datagrams _____ .
A) that are reassembled at the next router link
B) in order to adapt to the smallest link layer frame
C) that are reassembled only at the final destination
D) Both B and C options above are correct responses
E) None of the options above is valid

29. In TCP "slow start", after establishing the connection, the message flow rate is _____ .
A) increased linearly until first loss event
B) increased linearly after the first loss event
C) increased exponentially until the first loss event
D) None of these responses is correct.

30. In routers, "forwarding" refers to _____ .
A) the manner by which datagrams are routed from input to output ports of individual routers
B) the manner by which datagrams are routed from source to destination ports of end hosts
C) the set of algorithms required to ensure near-optimal path selection of datagrams
D) the control of traffic between communicating routers

31. Routers provide feedback to end systems to help in _____ .
A) Network-assisted flow control
B) Network-assisted congestion control
C) End-end congestion control
D) End-end flow control

32. Delays in packet delivery are usually caused by _____ .
A) queuing in router buffers
B) overflow in router buffers
C) retransmission of lost packets
D) All of these responses are correct.

33. The term "goodput" refers to the situation where _____ .
A) sending rate is larger than receiving rate
B) sending rate is smaller than receiving rate
C) sending rate is equal to receiving rate
D) packet loss occurs, but it is minimized

34. With TCP in the context of client-server connectivity, a disconnection from the session is achieved _____ .

A) When the client sends a FIN control segment to server and the server returns an ACK.
B) When the client sends a FIN control segment to server and the server returns an ACK followed by a FIN.
C) When the client sends a FIN control segment to server and the server returns an ACK, followed by the server sending a FIN control segment to client and the client returns an ACK.
D) None of the options above are valid

35 The length of a UDP packet header is _____ bytes.

A) 4
B) 8
C) 12
D) 16

36. Servers distinguish between multiple connected clients in TCP using _____ .

A) source port numbers
B) client IP addresses
C) client side socket numbers
D) All of these are correct responses.

37. Transport layer protocols do not provide _____ .

A) logical communication between hosts
B) delay guarantees
C) bandwidth guarantees
D) All of the above responses are correct.

38. An ATM network layer service model that guarantees minimum bandwidth, packet ordering and congestion feedback is _____ .

A) ABR
B) CBR
C) UBR
D) VBR

39. An IP datagram must specify _____ .
A) the length (in bytes) of the payload data
B) the maximum number of hops the datagram must take
C) the transport layer protocol to deliver payload to
D) All of these responses are correct.

40. In pipelining protocols, the selective repeat approach requires _____ .
A) Receiver only sends cumulative **`acks`**
B) Sender maintains timer for each **`unacked`** packet
C) Receiver **`acks`** individual packets
D) Both B and C responses are correct.

41. Head-of-the-line blocking _____ .
A) can occur in router output queues
B) can occur in router input queues
C) can lead to output buffer overflow
D) Both B and C responses are correct.

42. In the Go-Back-N approach, the sender _____.
A) retransmits all packets upon expiration of the timer
B) can have up to N unack'ed packets in pipeline
C) has timer for each packet
D) waits for receiver acknowledgement for each packet sent
E) All of the options above are correct responses

43. In the Selective Repeat approach, the sender _____.
A) can have up to N unack'ed packets in pipeline
B) relies upon receiver acknowledgement for each packet sent
C) has a timer for each packet sent
D) All of the options above are correct responses

44. Using TCP with rdt3.x, fast retransmit is performed _____.
A) if sender receives 2 ACKs for the same data
B) if sender receives 3 ACKs for the same data
C) if sender is unsure about whether the receiver has received a packet
D) None of these responses is correct.

45. Which layer has the responsibility of transferring datagrams from one node to adjacent node(s) over a link?
A) Application layer
B) Transport layer
C) Network layer
D) Link layer
E) Physical layer

46. Consider sending a 6000 byte datagram into a link that has a maximum transfer size (MTU) of 1000 bytes. How many fragments are generated?
A) 5
B) 6
C) 7
D) 8

47. A transport layer protocol provides for logical communication between _____ .
A) Hosts
B) Processes
C) Routers
D) NIC's
E) None of the options above is a valid response

48. TCP strives to give each connection traversing a congested link an equal share of the link's bandwidth. This service by TCP is known as _____.
A) congestion control
B) bandwidth control
C) equal-opportunity
D) multiplexing
E) All of the responses above are valid

49. Port numbers in the range 0 - 1023 are known as _____ .
A) small port numbers
B) destination port numbers
C) source port numbers
D) well-known port numbers

50. As segments arrive from the network, a destination host directs each segment to the appropriate socket by examining the destination port number. This process is known as _____ .
A) multiplexing
B) de-multiplexing
C) routing
D) segmenting

51. The maximum amount of data that can be placed in a segment is limited by the _____ .
A) maximum bandwidth
B) protocol used
C) maximum segment size
D) maximum transmission unit

52. A checksum is used to provide _____ .
A) arithmetic totals
B) error correction
C) congestion control
D) error detection

53. When an acknowledgement for client-to-server data is carried in a segment carrying server-to-client data, the acknowledgement is said to be _____ on the server-to-client segment.
A) acknowledged
B) segmented
C) piggybacked
D) multi-tasked

54. The _____ imposes a constraint on the rate at which a TCP sender can send traffic into the network.
A) congestion indicator
B) congestion window
C) bandwidth probe
D) choke packet

55. Which of the following is not a component of a route?
A) Switching ports
B) Switching fabric
C) Output ports
D) Input ports

56. In the datagram format for IPv4, the _____ field is included to ensure that datagrams do not circulate forever in the network.
A) options
B) time-to-live
C) protocol version
D) destination

57 IPv6 has _____-bit addresses.
A) 32
B) 64
C) 128
D) variable-length

58. Which protocol is used in order to configure IP addresses automatically?
A) ARP
B) DHCP
C) ICMP
D) RARP

59. What is the TCP response to a timeout event?
A) sending the next packet
B) retransmitting the segment that caused the timeout
C) restarting the connection and establishing a new connection
D) None of the options above is valid.

60. How long does it take to transmit 8000 bits in a 1Gbps link?
A) 25 ms
B) 8 ms
C) 80 ms
D) 250 ms

61. In IPv4, the IP address expressed in binary notation as

00001010 00000000 00000001 00000010

can be written in dotted-decimal notation as _____ .

A) 2.0.1.1
B) 101.0.0.10
C) 10.0.1.2
D) 10.1.0.101

62. To better manage the network, Network Administrators usually divide a single network into _____ by allocating ranges of IP addresses within the network.

A) islands
B) subnets
C) groups
D) LANs

63. _____ is used to extend the use of the limited IPv4 address space.

A) DHCP
B) DNS
C) TTL
D) NAT
E) ICMP

64. Which of the following options does hide the details of the home network from the Internet?

A) ARP
B) DHCP
C) ICMP
D) NAT

65. Suppose one client sends a packet with SYN=1, seq= 1000 to a server. What is the value of SYN and seq in response packet?

A) SYN = 0 ; seq = 1000
B) SYN = 0; seq = 1001
C) SYN = 1; seq = 1001
D) SYN =1; seq = 1000

End of Examination.

