

**MIDTERM EXAMINATION #2**  
**OPERATING SYSTEM CONCEPTS**  
**03-60-367-01**  
**UNIVERSITY OF WINDSOR**  
**SCHOOL OF COMPUTER SCIENCE**  
*Intersession 2008*

**Last Name:** .....

**First Name:** .....

**Student ID:** .....

**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 indicated above.
3. You will be asked to sign your name once before leaving the exam room (sign-out).
4. PLACE ANSWERS on Scantron sheet provided. DO NOT REMOVE any pages or attach any papers to this test or you will void your test and receive a mark of zero. If you need more space for rough work you may use any additional space on the examination paper.
5. 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.
6. You have 75 minutes to complete this test.
7. Midterm examination papers will be returned to students.

*Good Luck!*

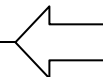
**I AGREE TO THE ABOVE TERMS AND WILL NEITHER RECEIVE  
NOR GIVE UNAUTHORIZED HELP ON THIS EXAM**

**TOTAL MARK:**

**/ 60**

.....  
**SIGNATURE**

.....  
**DATE**



**SIGN HERE**

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).

Place all responses on the Scantron sheet provided. In each case, be sure to carefully check the question number on both this examination paper and also the Scantron sheet. Completely fill in the circular area on the Scantron sheet, once again making sure to choose the correct circle corresponding to the examination question responses provided.

If an error is made you must carefully and completely erase the incorrect circular area on the Scantron sheet, then completely fill in the corrected circle you have selected.

---

1. Transport services and protocols provide logical communication between hosts.  
A) True  
B) **False**
  
2. Network services and protocols provide logical communication between processes.  
A) True  
B) **False**
  
3. Transport protocols run in end systems.  
A) **True**  
B) False
  
4. Internet transport-layer protocols provide delay and bandwidth guarantees.  
A) True  
B) **False**
  
5. In TCP based demultiplexing, TCP sockets are identified by \_\_\_\_\_.  
A) both sender and receiver port numbers  
B) sender IP address and port numbers  
C) receiver IP address and port number  
D) **both sender and receiver IP addresses and port numbers**
  
6. UDP does not provide \_\_\_\_\_.  
A) “no frills,” “bare bones” Internet transport protocol  
B) “best effort” service  
C) **handshaking between UDP sender, receiver**  
D) congestion control  
E) Both A and B are correct responses

7. In pipelining protocols, the Go-back-N approach requires \_\_\_\_\_ .
- A) **Sender can have up to N **unacked** packets in pipeline**
  - B) Receiver **acks** individual packets
  - C) If sender timer expires, retransmit all N packets
  - D) Sender has timer for each **unacked** packet
  - E) All of the above responses are correct
8. 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 these responses are correct.**
9. 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 these responses are correct.**
10. 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
11. IP datagrams may be fragmented into several smaller IP datagrams \_\_\_\_\_ .
- A) that are reassembled at the next router link
  - B) in order to adapt to the largest link layer frame
  - C) that are reassembled only at the final destination
  - D) **Both B and C are correct responses.**
12. 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

13. The IPv4 datagram header has length 40 bytes.  
A) True  
B) False
14. Network layer protocols must be defined in every host and router.  
A) True  
B) False
15. 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 first loss event  
D) Both B and C are correct responses.
16. Forwarding refers to \_\_\_\_\_.  
A) the manner by which datagrams are routed from source to destination ports of end hosts  
B) the manner by which datagrams are routed from input to output ports of individual routers  
C) the set of algorithms required to ensure near-optimal path selection of datagrams  
D) the control of traffic between communicating routers
17. The “Best effort” service model for Internet traffic provides no guarantees of bandwidth, loss or packet order and, further, requires that the occurrence of congestion must be inferred (ie. derived), rather than determined directly through network feedback.  
A) True  
B) False
18. Assuming that  $W$  is the maximum window size established by TCP “slow start”, and the round-trip time is  $RTT$ , what is the average throughput of TCP as a function of  $W$  and  $RTT$ ?  
A)  $RTT/W$   
B)  $0.5 \times W/RTT$   
C)  $0.75 \times W/RTT$   
D)  $0.75 \times RTT/W$ .

19. Datagram networks do not require call setup at the network layer.  
A) **True**  
B) False
20. In datagram networks \_\_\_\_\_.  
A) routers maintain state about end-to-end connections  
B) packets forwarded using destination host address and virtual circuit number  
C) **packets between same source-destination pair may take different paths**  
D) None of these responses is correct.
21. The calculated value of a TCP timeout should \_\_\_\_\_.  
A) **be greater than the round-trip time**  
B) eliminate unnecessary retransmissions  
C) allow quick reaction to changes in network topology  
D) All of these responses are correct.
22. Round-trip time (RTT) is estimated based on \_\_\_\_\_.  
A) a weighted average RTT that is fixed after several samples  
B) **a weighted average RTT that is continuously updated**  
C) sampling of routes to determine minimum cost paths  
D) None of these responses is correct.
23. 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.
24. The message payload of a UDP segment contains the 4-byte hexadecimal string E666D555<sub>16</sub>. The UDP checksum of this segment is \_\_\_\_\_.  
A) BBBB  
B) BBBC  
C) **4443**  
D) 4444
25. In pure P2P networks, peers may not change IP addresses.  
A) True  
B) **False**

26. Flow control is guaranteed to solve congestion problems.  
A) True  
B) False
27. In packet switched networks, store and forward refers to: \_\_\_\_\_.  
A) entire message must arrive at router before it can be transmitted on next link  
B) scheduling of packets to avoid congestion  
C) entire packet must arrive at router before it can be transmitted on next link  
D) entire packet must be stored on router until acknowledgement received
28. Routers provide feedback to end systems to help in \_\_\_\_\_.  
A) Network-assisted congestion control  
B) Network-assisted flow control  
C) End-end congestion control  
D) End-end flow control
29. An “elastic” service is one that is capable of providing a range of service delivery adapted to available resources.  
A) True  
B) False
30. Packet switching in the network core leads to \_\_\_\_\_.  
A) bandwidth subdivision  
B) resource contention  
C) shared circuit switching  
D) packet loss
31. ATM devices use a packet structure whose size is \_\_\_\_\_ bytes .  
A) 20  
B) 48  
C) 53  
D) None of these responses is correct.

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 end-to-end congestion control congestion is inferred from end-system observed loss and delay.  
A) True  
B) False
35. The size of the TCP receive window (**RcvWindow**) never changes throughout the duration of the connection.  
A) True  
B) False
36. 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 these responses is correct.
37. In order to establish support for a possible TCP connection session it is necessary for the server side to create a listening socket.  
A) True  
B) False

38. UDP is often used for streaming multimedia apps because \_\_\_\_\_.  
A) it is loss tolerant  
B) it is rate sensitive  
C) Both A and B responses are correct.  
D) None of these responses is correct.
39. The length of a UDP packet header is \_\_\_\_\_ bytes.  
A) 4  
B) 8  
C) 12  
D) 16
40. The characteristics of unreliable channels determines the complexity of reliable data transfer protocol.  
A) True  
B) False
41. In the client-server model the time it takes for a server to distribute a file of size F to N clients is \_\_\_\_\_.  
A) proportional to F  
B) increases linearly with N, for large N  
C) Both A and B responses are correct.  
D) None of these responses is correct.
42. A host-local, application-created, OS-controlled interface into which an application process can both send and receive messages to or from another application process is called a(n) \_\_\_\_\_.  
A) client-server paradigm  
B) peer  
C) socket  
D) protocol
43. 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.



44. A \_\_\_\_\_ is a sequence of characters that flow into or out of a process.  
A) pipeline  
B) stream  
C) message flow  
D) socket
45. In client-server programming with UDP \_\_\_\_\_.  
A) sender explicitly attaches IP address and port of destination to each packet  
B) there is no handshaking  
C) server must extract IP address, port of sender from received packet  
D) All of these responses are correct.
46. Gathering data from multiple sockets and enveloping data with a header is called \_\_\_\_\_.  
A) segmentation  
B) multiplexing  
C) demultiplexing  
D) integration
47. 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.
48. Socket API's provide \_\_\_\_\_.  
A) unreliable datagram transport service  
B) reliable, byte stream-oriented transport service  
C) Both A and B are correct responses.  
D) None of these responses is correct.
49. Network layer protocols must exist in every host and router.  
A) True  
B) False
50. In socket programming it may happen that transmitted data may be received out of order, or lost.  
A) True  
B) False

51. A router examines header fields in all IP datagrams passing through it.  
A) True  
B) False
52. An ATM network layer service model that guarantees minimum bandwidth, packet ordering and congestion feedback is \_\_\_\_\_.  
A) ABR  
B) CBR  
C) UBR  
D) VBR
53. 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.
54. Datagram networks require call setup at the network layer.  
A) True  
B) False
55. In datagram networks packets between the same source-destination pair may take different paths.  
A) True  
B) False
56. In datagram networks the time a datagram spends in a router buffer is controlled by the round trip time.  
A) True  
B) False
57. IP fragmentation occurs due to different network link types with different maximum transfer units.  
A) True  
B) False

58. 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.
59. 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.
60. In pipelining protocols, the Go-back-N approach requires \_\_\_\_\_.  
A) sender can have up to N **unacked** packets in pipeline, in general  
B) receiver **acks** individual packets  
C) if sender timer expires, retransmit all N packets  
D) sender has timer for each “in flight” packet