

**THE UNIVERSITY OF WESTERN ONTARIO  
LONDON CANADA**

**COMPUTER SCIENCE 457a  
FINAL EXAMINATION  
DECEMBER 20, 2006  
3 HOURS**

NAME: \_\_\_\_\_

STUDENT NUMBER: \_\_\_\_\_

Question

1-30. \_\_\_\_\_

31. \_\_\_\_\_

32. \_\_\_\_\_

33. \_\_\_\_\_

34. \_\_\_\_\_

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40. \_\_\_\_\_

TOTAL \_\_\_\_\_

(Out of 180 marks)

There are no cheat sheets, books, or other reference materials allowed for this exam. No calculators, cell phones, or other electronic devices are permitted either.

Part I – Multiple Choice, True/False – Choose the best answer from the choices given. Circle your answer on the paper, and fill in the answer on the Scantron form. [60 marks total, 2 marks each]

1. Which of the following methods of recovering from packet loss do not incur any redundancy overhead:
  - a. Forward Error Correction (FEC) using exclusive ORs.
  - b. Forward Error Correction (FEC) using piggybacking.
  - c. Interleaving.
  - d. All of the above.
  - e. None of the above.
  
2. Which approach to audio and video compression results in predictable resource requirements that make network resource management easier?
  - a. Constant bit rate compression.
  - b. Variable bit rate compression.
  - c. Both constant and variable bit rate compression.
  - d. Neither constant nor variable bit rate compression.
  
3. Using a leaky token bucket for policing and a weighted fair queuing approach to scheduling, we can provide provable upper bounds on delays.
  - a. True.
  - b. False.
  
4. Suppose Bob is purchasing merchandise from Alice Inc. over the Internet. SSL permits:
  - a. Bob to determine whether Alice Inc. is authorized to accept credit card purchases.
  - b. Alice Inc. to determine if Bob has a good credit history.
  - c. Bob to determine if Alice Inc. is a legitimate company.
  - d. All of the above.
  - e. None of the above.
  
5. All monoalphabetic ciphers are vulnerable to a chosen-plaintext attack.
  - a. True.
  - b. False.
  
6. Intermediate routers on the Internet process Authentication Header (AH) and Encapsulation Security Payload (ESP) protocol messages as they would regular data messages.
  - a. True.
  - b. False.

- 
7. Which of the following statements best describes the purpose of the SNMP protocol:
    - a. The SNMP protocol specifies the actions a network manager should take in response to a specific set of network fault conditions.
    - b. The SNMP protocol is used by the network manager to provision resources, such as bandwidth, server capacity and other computational/communication resources needed to meet the mission-specific needs of an enterprise.
    - c. The SNMP protocol is a method for gathering data about network conditions and executing remote actions at remote managed devices.
    - d. All of the above.
    - e. None of the above.
  
  8. What is the purpose of a presentation service?
    - a. To display data in a format specified by a user.
    - b. To encode, transmit, and translate data from one machine-specific format to another.
    - c. To allow a client to inform a server that it (the client) is present and ready to receive data.
    - d. All of the above.
    - e. None of the above.
  
  9. A Management Information Base (MIB) is a repository of data maintained at a managing entity site, providing the network manager with a centralized, quick-to-query database regarding current network status.
    - a. True.
    - b. False.
  
  10. The SOAP approach to network problem solving always leads to a conclusion the first time it is applied.
    - a. True.
    - b. False.
  
  11. Which of the following management protocols are IETF standards defined in RFCs?
    - a. CMIP
    - b. SNMP
    - c. ARM
    - d. All of the above.
    - e. None of the above.

12. Suppose that the OID for the UDP MIB module is 1.3.6.1.2.1.7. If the managed object declaration for the `udpInDatagrams` managed object looked like:

```
udpInDatagrams OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of UDP datagrams
delivered to UDP users."
    ::= { udp 1 }
```

This would mean the following:

- a. The OID for `udpInDatagrams` is 1.3.6.1.2.1.7.1.
  - b. This object is valid for use.
  - c. The object cannot be written to.
  - d. All of the above.
  - e. None of the above.
13. The SNMP standards dictate that if an SNMP message is lost, a managing entity must always:
- a. Retransmit the message immediately.
  - b. Retransmit the message after a timeout period.
  - c. Retransmit the message only if the management agent requests it to do so.
  - d. Never retransmit a message.
  - e. None of the above—the standard does not require a specific action.
14. Network manageability is an issue when the network is too large AND also when the network is not large enough.
- a. True.
  - b. False.
15. Understanding your network is the most important factor in deciding what to manage and what not to manage in your network.
- a. True.
  - b. False.
16. When a change is made in a network, any problems that could arise from the change surface immediately.
- a. True.
  - b. False.
17. When you have a problem in your network, it is likely that all affected users have noticed and reported the problem.
- a. True.
  - b. False.

18. You cannot measure the behaviour of the network without influencing its behaviour in subtle ways.
- True.
  - False.
19. Wireless service can typically be deployed faster than wired service.
- True.
  - False.
20. Which type of satellite remains in the same position over the Earth as the Earth rotates?
- GEO satellites.
  - MEO satellites.
  - LEO satellites.
  - All of the above.
  - None of the above.
21. Which type of satellite has the largest propagation delay?
- GEO satellites.
  - MEO satellites.
  - LEO satellites.
  - All of the above have equal delays.
  - None of the above.
22. Which type of satellite requires the most satellites in orbit to cover the Earth?
- GEO satellites.
  - MEO satellites.
  - LEO satellites.
  - All of the above.
  - None of the above.
23. In Mobile IP, a registered mobile node cannot receive broadcast packets that it would have received on its home network.
- True.
  - False.
24. Mobile IP provides methods for securing communications in which stages:
- Discovery.
  - Registration.
  - Tunneling.
  - All of the above.
  - None of the above.

25. Because of the lack of power and small screen size on most wireless and mobile devices, the Wireless Markup Language (WML) has no support for image files.
- True.
  - False.
26. Mobile IP is required to maintain network connectivity in an 802.11 network when a mobile node moves:
- Within a single Basic Service Set (BSS).
  - Between two Basic Service Sets (BSSs).
  - Between two Extended Service Sets (ESSs).
  - All of the above.
  - None of the above.
27. How many Bluetooth piconets can coexist in the same coverage area?
- 1
  - 2
  - 7
  - 79
  - None of the above.
28. All Bluetooth devices are always visible to the discovery scans of other Bluetooth devices.
- True.
  - False.
29. Collision detection is generally not possible in a wireless network.
- True.
  - False.
30. The 802.11b frequency spectrum is divided into how many channels?
- 1
  - 3
  - 11
  - 14.
  - None of the above.

Part II – Short/Long Answer – Complete the following questions in the space provided on the exam paper.

31. The following questions deal with scheduling disciplines for networks. [15 marks total]

a. How does FIFO scheduling work? Name and briefly discuss three possible discard policies for FIFO scheduling. [5 marks]

b. How does round robin scheduling of network traffic work? What are the differences between a pure round robin approach and a work conserving round robin approach? [5 marks]

c. Describe how the weighted fair queuing (WFQ) approach to network scheduling works. How can a weighted fair queuing approach be made to act the same as a work conserving round robin approach? [5 marks]



33. The following questions deal with network management in general. [12 marks total]
- a. What are the differences between proactive and reactive network management? [4 marks]

- b. Why is proactive network management preferable to reactive network management? [4 marks]

- c. If proactive network management is preferable to reactive network management, why is it not done more frequently in today's networks? [4 marks]



35. Suppose you are trying to test the liveness of a web server machine hidden behind a firewall. Why might ping not be able to do a liveness test in this case? Explain how telnet can be used to test liveness instead, and why this could work even if ping fails. [7 marks]

36. What is wrong with the following statement: “With determination, enough time, and the right tools for the job, anything can be done in managing computer networks.” [8 marks]



38. The following questions deal with problems in wireless networks. [14 marks total]
- a. What is the “hidden terminal” problem in a wireless network? What issues does this create for a wireless network? Explain your answer, and provide a diagram. [7 marks]

- b. What is the “signal fading” problem in a wireless network? What issues does this create for a wireless network? Explain your answer and provide a diagram. [7 marks]

39. The following questions deal with the Wireless Application Protocol (WAP).  
[14 marks total]

a. Why is the Wireless Application Protocol (WAP) used? Why not just use the appropriate protocols from the IP protocol stack on all devices instead? [8 marks]

b. Can end-to-end security (from a wireless device to an Internet server and back again) be provided in a Wireless Application Protocol (WAP) environment? If so, explain how. If not, explain why it is not possible. [6 marks]



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