

THE UNIVERSITY OF AUCKLAND

SECOND SEMESTER, 2016
Campus: City

COMPUTER SCIENCE

Modern Data Communications

(Time allowed: 40 minutes)

NOTE:

- Enter your name and student ID into the Teleform sheet **FIRST**.
- **THEN:** Attempt *all* questions!
- All questions have **ONE** correct answer.
- **DO NOT** tick two answers as correct for the same question.
- If you believe that there is an error in a question (multiple correct answers or no correct answer), select the answer you believe was intended as the correct one and contact the test room supervisor after the test.
- Hand in your Teleform sheet, but *keep your question sheets*.
- Use of calculators is **NOT** permitted.
- Good luck!

1. Which one of the following statements is FALSE about IPSec?

- A. All traffic can be secured regardless of applications
- B. Transport and tunnel modes can work with both AH and ESP protocols
- C. Tunnel mode works with ESP only
- D. Tunnel mode encapsulates both IP header and payload into IPSec packets
- E. Transport mode secures packet payload and leaves IP header unchanged

2. Consider the following statements:

W: Authentication deals with identification of communicating parties.

X: Authorisation deals with granting access to requested resources.

Y: Authentication deals with granting access to requested resources.

Z: Authorisation deals with identification of communicating parties.

In the list below, which set of statements is correct?

- A. W and X
- B. W and Z
- C. X and Y
- D. X and Z
- E. Y and Z

3. Which one of the following statements is FALSE about routing protocols?

- A. Exterior Gateway Protocol (EGP) is used to route packets to other ASes
- B. Open Shortest Path First (OSPF) is an example of EGP
- C. Interior Gateway Protocol (IGP) is used to route packets within the AS
- D. Border Gateway Protocol (BGP) is an example of EGP
- E. Routing Information Protocol (RIP) is an example of IGP

4. Which of the following statements about twisted-pair cables is FALSE?

- A. The two wires in each pair twisted together
- B. Signals in one twisted pair will interfere with the signal in at least one of the other pairs
- C. The pairs in such a cable can carry data signals, e.g. for wired Ethernets
- D. Twisted-pair cables have several pairs of insulated copper wires
- E. Each wire in a twisted pair carries a complementary signal

5. Which combination of security services is provided by Message Authentication Codes?

- A. Authentication and confidentiality only
- B. Confidentiality and integrity only
- C. Integrity and non-repudiation only
- D. Non-repudiation and availability only
- E. Authentication and integrity only

6. Which one of the following is FALSE about Network Address Translation (NAT)?

- A. NAT is a router function where IP addresses are replaced at the boundary of a private network
- B. NAT is a method that enables hosts on private networks to communicate with hosts on the Internet
- C. Using NAT, devices inside a local network are not explicitly addressable or visible by outside world
- D. NAT is a tool in conserving global address space allocations
- E. A NAT can support 256 simultaneous connections with a single public IP address

7. Consider the following statements:

X: A centralised controller can be a single point of failure.

Y: SDN enables easy interception of packets.

Z: There are severe consequences if a controller gets compromised.

Which of the following best describes SDN issues?

- A. Y only
- B. Y and Z only
- C. X and Z only
- D. X and Y only
- E. All of X, Y and Z

8. Which of the following security services does SSL/TLS provide?

- A. All of authentication, confidentiality, integrity, availability and non-repudiation
- B. Authentication, confidentiality and availability only
- C. Authentication, confidentiality, integrity and non-repudiation only
- D. Authentication, confidentiality and integrity only
- E. Confidentiality, integrity and availability only

9. Which one of following statements is FALSE about Time-to-Live (TTL) in IPv4?

- A. TTL is not included in the IP header checksum since it changes
- B. TTL is used to prevent loops
- C. TTL defines lifetime of a packet
- D. A packet is discarded when TTL reaches 0
- E. TTL is decremented by each router on the path

10. In the context of TCP/IP, which one of the following is FALSE?

- A. Ethernet is a data link layer protocol
- B. IPv6 is a network layer protocol
- C. BGP is a network layer protocol
- D. TCP is a transport layer protocol
- E. UDP is a transport layer protocol

11. Which of the following statements about wireless propagation is FALSE?

- A. A wireless signal from an isotropic antenna in free space propagates 'spherically,' i.e. uniformly in all directions
- B. Obstacles in the signal path may cause extra signal losses
- C. Received signal powers less than 10^{11} times smaller than a transmitted signal's power can never be used for reliable communication
- D. Radio signals propagate at the speed of light, c , i.e. about 3×10^8 m/s in free space
- E. The signal voltage at distance d from the antenna is half that at distance $d/2$

12. Which of the following is NOT an advantage of Low Earth Orbit satellites, as compared to geostationary satellites?

- A. Renting a satellite channel can be much cheaper than laying a long under-sea cable
- B. Their signals have less attenuation on the path to Earth
- C. They can have an 'inclination,' i.e. an orbital plane at an angle to the equatorial plane
- D. Their orbital altitude is less, hence they are cheaper to launch
- E. Their latency (propagation time of signals from Earth to satellite and back) can be much higher

13. Amplitude shift keying of a carrier signal with a square wave of frequency f ...

- A. causes no sidebands to appear in the power spectrum
- B. is the same as phase shift keying.
- C. causes the same power spectrum as frequency shift keying the carrier
- D. causes sidebands at $\pm f$ Hz, $\pm 3f$ Hz, $\pm 5f$ Hz etc. around the carrier frequency
- E. causes two sidebands only

14. Which one of the following is NOT an active attack?

- A. Denial of Service (DoS)
- B. Message modification
- C. Traffic analysis
- D. Replay
- E. Masquerade

15. How many dB does a power ratio of 1200:1 approximately correspond to?

- A. 61 dB
- B. 31 dB
- C. 60 dB
- D. 36 dB
- E. 12 dB

16. Consider the following statements:

X: The basic header is of fixed length.

Y: Fragmentation is taken care by the traffic source.

Z: Header checksums are eliminated.

Which of these simplifications are implemented in IPv6?

- A. All of X, Y and Z
- B. X only
- C. Y only
- D. X and Y only
- E. Z only

17. Which one of the key exchange methods in SSL/TLS is vulnerable to Man-in-the-Middle (MITM) attack?

- A. Ephemeral DH
- B. Fixed Diffie-Hellman (DH)
- C. Anonymous DH
- D. RSA
- E. No key exchange method is vulnerable to MITM attack

18. Consider a QPSK constellation diagram with four constellation points at 0, 90, 180, and 270 degrees and at equal distance to the origin. Labelling the constellation points in a clockwise direction from the constellation point at 0 degrees, which of the following is a Gray code?

- A. 11, 00, 01, 10
- B. 01, 11, 00, 10
- C. 10, 00, 11, 01
- D. 00, 01, 11, 10
- E. 00, 01, 10, 11

SPARE PAGE FOR ROUGH WORKING

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