TRUE/FALSE

1. Standards assist in network design.

   ANS: T PTS: 1 REF: 39

2. Network functions are associated with only one layer of the OSI model.

   ANS: F PTS: 1 REF: 43

3. The Application layer includes software applications.

   ANS: F PTS: 1 REF: 44

4. Not all Transport layer protocols are concerned with reliability.

   ANS: T PTS: 1 REF: 48

5. For greater network efficiency, segmentation is preferred.

   ANS: F PTS: 1 REF: 51

MULTIPLE CHOICE

1. Standards define the ____ performance of a product or service.
   a. ideal
   b. most acceptable
   c. minimum acceptable
   d. maximum acceptable

   ANS: C PTS: 1 REF: 39

2. The goal of ____ is to establish international technological standards to facilitate the global exchange of information and barrier free trade.
   a. ANSI
   b. ISO
   c. ITU
   d. ISOC

   ANS: B PTS: 1 REF: 41

3. The ____ is a specialized United Nations agency that provides developing countries with technical expertise and equipment to advance those nations' technological bases.
   a. ANSI
   b. ISO
   c. ITU
   d. ISOC

   ANS: C PTS: 1 REF: 41

4. ____ oversees the IAB (Internet Architecture Board).
   a. EIA
   b. ISOC
   c. ICANN
   d. ISO

   ANS: B PTS: 1 REF: 41

5. Which statement accurately describes the OSI model?

a. It describes how software programs interact with humans.
b. It prescribes the type of hardware or software that should support each layer.
c. It describes how software programs interact with other software programs.
d. It describes a theoretical representation of what happens between two nodes communicating on a network.

ANS: D PTS: 1 REF: 43

6. Which OSI model layer initiates the flow of information?
a. Physical
b. Session
c. Application
d. Presentation

ANS: C PTS: 1 REF: 43

7. Which OSI model layer manages data encryption?
a. Physical
b. Session
c. Application
d. Presentation

ANS: D PTS: 1 REF: 45

8. In which OSI model layer does TCP operate?
a. Physical
b. Transport
c. Network
d. Data Link

ANS: B PTS: 1 REF: 47

9. Which type of protocol is useful when data must be transferred quickly?
a. connection-oriented
b. connectionless
c. TCP
d. IP

ANS: B PTS: 1 REF: 48

10. Transport layer protocols break large data units into ____.
a. PDUs
b. segments
c. frames
d. block IDs

ANS: B PTS: 1 REF: 48

11. ____ is the process of reconstructing segmented data.
a. Reassembly
b. Reengineering
c. Resegmenting
d. Realigning

ANS: A PTS: 1 REF: 48

12. Each network node has ____ types of addresses.
a. two
b. three
c. four
d. five

ANS: A PTS: 1 REF: 50

13. The process of determining the best path from Point A on one network to Point B on another is known as ____.
a. mapping
b. enhancing
c. reconfiguring
d. routing

ANS: D PTS: 1 REF: 50

14. In which OSI model layer does IP operate?
    a. Physical
    b. Transport
    c. Network
    d. Data Link

    ANS: C PTS: 1 REF: 50

15. Which Data Link sublayer manages flow control?
    a. LLC
    b. MAC
    c. Management layer
    d. Addressing layer

    ANS: A PTS: 1 REF: 52

16. Which Data Link sublayer manages access to the physical medium?
    a. LLC
    b. MAC
    c. Management layer
    d. Addressing layer

    ANS: B PTS: 1 REF: 52

17. The ____ is a fixed number associated with a device's NIC.
    a. LLC address
    b. frame address
    c. logical address
    d. physical address

    ANS: D PTS: 1 REF: 52

18. In which OSI model layer do hubs operate?
    a. Physical
    b. Network
    c. Data Link
    d. Physical and Data Link

    ANS: A PTS: 1 REF: 55

19. In which OSI model layer(s) do NICs operate?
    a. Physical
    b. Network and Physical
    c. Data Link
    d. Physical and Data Link

    ANS: D PTS: 1 REF: 55

20. Which IEEE standard describes Ethernet?
    a. 802.1
    b. 802.3
    c. 802.5
    d. 802.11

    ANS: B PTS: 1 REF: 58

21. Which IEEE standard describes specifications for wireless transmissions?
    a. 802.1
    b. 802.3
    c. 802.5
    d. 802.11

    ANS: D PTS: 1 REF: 59

COMPLETION

1. _____ are documented agreements containing technical specifications or other precise criteria that stipulate how a particular product or service should be designed or performed.

   ANS: Standards

   PTS: 1 REF: 39

2. The Application layer separates data into _____, or discrete amounts of data.

   ANS:
   PDUs (protocol data units)
   protocol data units
   PDUs

   PTS: 1 REF: 43

3. _____ is the process of gauging the appropriate rate of transmission based on how fast the recipient can accept data.

   ANS: Flow control

   PTS: 1 REF: 47

4. _____ protocols establish a connection with another node before they begin transmitting data.

   ANS: Connection oriented

   PTS: 1 REF: 47

5. A network's _____ represents the largest data unit the network will carry.

   ANS:
   MTU (maximum transmission unit)
   maximum transmission unit
   MTU

   PTS: 1 REF: 48

MATCHING

Match each item with a statement below:

a. ANSI
b. ISO
c. IEEE
d. ISOC
e. Presentation layer
f. Session layer
g. Transport layer
h. Network layer
i. Physical layer

1. A professional membership society that helps to establish technical standards for the Internet.
2. A collection of standards organizations representing 162 countries.
3. Determines standards for the electronics industry and other fields, such as chemical and nuclear engineering, health and safety, and construction.
4. An international society composed of engineering professionals with goals of promoting development and education in the electrical engineering and computer science fields.
5. Translates network addresses into their physical counterparts.
6. Serves as a translator.
7. Generates signals as changes in voltage at the NIC.
8. Manages end-to-end delivery of data.

9. Coordinates and maintains communications between two nodes on the network.

1. ANS: D PTS: 1 REF: 41
2. ANS: B PTS: 1 REF: 41
3. ANS: A PTS: 1 REF: 40
4. ANS: C PTS: 1 REF: 40
5. ANS: H PTS: 1 REF: 50
6. ANS: E PTS: 1 REF: 45
7. ANS: I PTS: 1 REF: 55
8. ANS: G PTS: 1 REF: 47
9. ANS: F PTS: 1 REF: 46

SHORT ANSWER

1. Describe the OSI model Session layer's functions.

   ANS:
   Among the Session layer's functions are establishing and keeping alive the communications link for the duration of the session, keeping the communication secure, synchronizing the dialogue between the two nodes, determining whether communications have been cut off, and, if so, figuring out where to restart transmission, and terminating communications. Session layer services also set the terms of communication by deciding which node communicates first and how long a node can communicate. If a connection is lost, the Session layer protocols will detect that and initiate attempts to reconnect. If they cannot reconnect after a certain period of time, they will close the session and inform your client software that communication has ended. Finally, the Session layer monitors the identification of session participants, ensuring that only the authorized nodes can access the session.

   PTS: 1 REF: 46

2. Define a checksum and describe how Transport layer protocols implement them to ensure data integrity.

   ANS:
   To ensure data integrity further, connection-oriented protocols such as TCP use a checksum. A checksum is a unique character string that allows the receiving node to determine if an arriving data unit exactly matches the data unit sent by the source. Checksums are added to data at the source and verified at the destination. If at the destination a checksum doesn't match what the source predicted, the destination's Transport layer protocols ask the source to retransmit the data.

   PTS: 1 REF: 48

3. Define and describe sequencing.

   ANS:
   Sequencing is a method of identifying segments that belong to the same group of subdivided data. Sequencing also indicates where a unit of data begins, as well as the order in which groups of data were issued and, therefore, should be interpreted. While establishing a connection, the Transport layer protocols from two devices agree on certain parameters of their communication, including a sequencing scheme. For sequencing to work properly, the Transport layer protocols of two nodes must synchronize their timing and agree on a starting point for the transmission.

   PTS: 1 REF: 48-49

4. Describe a network address including its addressing scheme, formats and alternate names.

   ANS:
   Network addresses follow a hierarchical addressing scheme and can be assigned through operating system software. They are hierarchical because they contain subsets of data that incrementally narrow down the location of a node, just as your home address is hierarchical because it provides a country, state, zip code, city, street, house number, and person's name. Network layer address formats differ depending on which Network layer protocol the network uses. Network addresses are also called Network layer addresses, logical addresses, or virtual addresses.

   PTS: 1 REF: 50

5. Describe the role of Network layer protocols including the formation of packets, routing and factors considered in routing decisions.

   ANS:
   Network layer protocols accept the Transport layer segments and add logical addressing information in a network header. At this point, the data unit becomes a packet. Network layer protocols also determine the path from point A on one network to point B on another network by factoring in:

   - Delivery priorities (for example, packets that make up a phone call connected through the Internet might be designated high priority, whereas a mass e-mail message is low priority)
   - Network congestion
   - Quality of service (for example, some packets may require faster, more reliable delivery)
   - Cost of alternative routes

   PTS: 1 REF: 50

6. Describe how error checking is handled in the Data Link layer.

   ANS:
   Error checking is accomplished by a 4-byte FCS (frame check sequence) field, whose purpose is to ensure that the data at the destination exactly matches the data issued from the source. When the source node transmits the data, it performs an algorithm (or mathematical routine) called a CRC (cyclic redundancy check). CRC takes the values of all of the preceding fields in the frame and generates a unique 4-byte number, the FCS. When the destination node receives the frame, its Data Link layer services unscramble the FCS via the same CRC algorithm and ensure that the frame's fields match their original form. If this comparison fails, the receiving node assumes that the frame has been damaged in transit and requests that the source node retransmit the data.

   PTS: 1 REF: 52

7. Define and describe the two parts of a physical address.

   ANS:
   The first part, known as the OUI (Organizationally Unique Identifier), is a character sequence assigned by IEEE that identifies the NIC's manufacturer. For example, a series of Ethernet NICs manufactured by the 3Com Corporation begins with the six-character sequence "00608C," while a series of Ethernet NICs manufactured by Intel begins with "00AA00." Some manufacturers have several different OUIs. IEEE also uses the term company_id to refer to the OUI. Traditionally, this portion of a physical address is sometimes called the block ID.

The remaining characters in a physical address, known as the extension identifier, identify the interface. Vendors such as 3Com and Intel assign each NIC a unique extension identifier, based on the NIC's model and manufacture date. By assigning unique extension identifiers, companies ensure that no two NICs share the same physical address. Extension identifiers may also be known as device IDs.

PTS: 1 REF: 53-54

8. Describe Physical layer protocol functions when receiving data.

ANS:
When receiving data, Physical layer protocols detect and accept signals, which they pass on to the Data Link layer. Physical layer protocols also set the data transmission rate and monitor data error rates. However, even if they recognize an error, they cannot perform error correction. When you install a NIC in your desktop PC and connect it to a cable, you are establishing the foundation that allows the computer to be networked. In other words, you are providing a Physical layer.

PTS: 1 REF: 55

9. Compare Ethernet and Token Ring frames in terms of their operation on a network.

ANS:
Ethernet frames are different from token ring frames, and the two will not interact with each other on a network. In fact, most LANs do not support more than one frame type, because devices cannot support more than one frame type per physical interface, or NIC. (NICs can, however, support multiple protocols.) Although you can conceivably transmit both token ring and Ethernet frames on a network, Ethernet interfaces cannot interpret token ring frames, and vice versa. Normally, LANs use either Ethernet or token ring, and almost all contemporary LANs use Ethernet.

PTS: 1 REF: 59

10. Briefly describe IEEE's Project 802.

ANS:
IEEE's Project 802 is an effort to standardize physical and logical elements of a network. IEEE developed these standards before the OSI model was standardized by ISO, but IEEE's 802 standards can be applied to the layers of the OSI model.

PTS: 1 REF: 59