

SECTION A

1. How many bits are allocated to the *network Id* of a class C IP address?

a) 24	c) 21
b) 22	d) 23

 2. Which of the following best describes the improvement of slotted ALOHA medium access control technique?
 - a) Time on the channel is arranged into random time slots whose size equals the frame transmission time.
 - b) Time on the channel is arranged into dedicated time slots whose size differs from the transmission time.
 - c) Time on the channel is organized into uniform slots whose size equals the frame transmission time.
 - d) Time on the channel is organized into small slots whose size equals the frame transmission time.

 3. Which of the following is **not** valid concerning the design aspect of a *simple bridge*?
 - a) It makes no modification to the content or format of the frames it receives.
 - b) It should contain enough buffer space to meet peak demands.
 - c) It must know which addresses are on each network.
 - d) It is capable of analyzing the addresses for any malicious pattern.

 4. Which of the following devices is used as the *start* for the tree topology?

a) Headend	c) Connector
b) Terminator	d) Controller

 5. Which of the following statements best describes the meaning of an *aperiodic* signal?
 - a) The same signal pattern that changes in amplitudes over time.
 - b) The same signal pattern that does not repeat over time.
 - c) The same signal pattern that increases in frequency over time.
 - d) The same signal pattern that repeats over time.
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6. What information does the subnet mask include in IP addressing?

- a) Subnet number and Host number
- b) Network number and Host number
- c) Subnet number and Gateway number
- d) Station number and Port number

7. Which of the following statements describes a cause of *thermal noise*?

- a) Electrical coupling between nearby cables
- b) Varying delays experienced at its constituent frequencies
- c) Irregular pulses of short duration and of relatively high amplitude
- d) Thermal agitation of electrons

8. Which of the following best describes the functionality of the *control plane* for ATM protocol architecture?

- a) Provides information transfer, flow control, and error control.
- b) Performs call control and connection control.
- c) Provides coordination between all planes.
- d) Mapping higher-layer information into ATM cells to be transported over the network.

9. Which of the following switching techniques does **not** suffer any delays before a message can be sent?

- a) Circuit
- b) Virtual circuit
- c) Datagram packet
- d) Cell

10. Which *frequency band* does the FM radio use for its transmissions?

- a) Medium frequency
- b) Ultra high frequency
- c) Very high frequency
- d) Low frequency

11. Which of the following technologies has been the major technical contribution to *broadband ISDN* ?

- a) frame relay
 - b) cell relay
 - c) X.25
 - d) None of the above
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12. What is the *maximum* number of simultaneous virtual circuits a data terminal equipment is permitted to establish for X.25 multiplexing service?

- a) 4095
- b) 4080
- c) 4100
- d) 4075

13. Which of the following data units is created when higher-level data is passed into the logical link control(LLC) layer for IEEE reference model?

- a) Logical data unit
- b) Network data unit
- c) Protocol data unit
- d) Service data unit

14. What information is exchanged between nodes for *adaptive routing* to function properly?

- a) State of the connection
- b) State of the router
- c) State of the nodes
- d) All of the above

15. Which of the following *levels* is not required by the X.25 standard for its operations?

- a) Packet
- b) Data
- c) Link
- d) Physical

16. Which of the following switching techniques is considered to be connectionless-oriented data transfer?

- a) Virtual-circuit
- b) Circuit
- c) Datagram
- d) Packet

17. Which of the following is a *disadvantage* for implementing centralized medium access control approach?

- a) It does not allow activities such as priorities, overrides, and guaranteed capacity.
 - b) It can cause bottlenecks and lower performance of the network.
 - c) It complicates access logic at each station.
 - d) It causes problems of distributed coordination among peer entities.
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18. Which of the following is **true** in relation to *frame relay* being designed to eliminate much of the overhead that X.25 imposes on end user systems?

- a) Multiplexing and switching logical connections takes place at layer 3 instead of layer 2 to eliminate one entire layer of processing
- b) There is hop-by-hop flow control and error control.
- c) This approach adopts longer internal network processing.
- d) It does not provide end-to-end flow and error control.

19. Which of the following is **not** a control mechanism belonging to ATM's *virtual path*?

- a) Setting maximum cell size
- b) Calculating routes
- c) Allocating capacity
- d) Storing connection state

20. Which of the following statements is **true** concerning the *Go-Back-N* automatic repeat request error control?

- a) When the source station receives a REJ, it must retransmit the frame in error plus all succeeding frames.
- b) The receiving station may receive duplicate copies of frames due to corrupted acknowledgment.
- c) The receiving station buffers any frames that are received out of order.
- d) The window size limitation is more restrictive compared to selective-reject.

21. Which of the following is a function of the Logical Link Layer (LLC) sub-layer in the IEEE Reference Model for LANs?

- a) On transmission, assembles data into frames with address and error-detection fields.
- b) On reception, disassembles frame, and performs address recognition and error detection.
- c) Governs access to the LAN transmission medium.
- d) Provides an interface to higher layers and perform flow control and error control.

22. Which layer does a *router* function at within the OSI model?

- a) Logical Link Control (LLC)
 - b) Medium Access Control (MAC)
 - c) Physical
 - d) Network
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23. Which of the following statements does **not** state a difference between FDDI compared to the Token ring?

- a) Both 16 and 48 bit addresses are allowed in the same network with FDDI.
- b) It includes a preamble to aid in clocking.
- c) It does not include priority and reservation bits.
- d) The capacity allocation is handled differently.

24. Which of the following is **not** a valid approach in determining which node or nodes in the network is responsible for routing decisions?

- a) Decentralized routing
- b) Source routing
- c) Centralized routing
- d) Distributed routing

25. Which of the following statements is **not** true in relation to switching hubs being able to provide better network utilization?

- a) Each attached device has a dedicated capacity equal to that of the entire original LAN.
- b) Additional devices can be attached to the switching by increasing the capacity of the hub correspondingly.
- c) No change is necessary to the software or hardware of the attached devices to convert a bus LAN to a switching hub LAN.
- d) The Store-and-forward switch produces the highest possible throughput.

26. Which of the following frame or frames would be retransmitted for the *selective-reject ARQ*, if frames 8, 9, 10, 11, 12, 13, 14 were transmitted but frame 10 was lost during transmission?

- a) 10, 11, 12, 13, 14
- b) 11, 12, 13, 14
- c) Only 10
- d) All of them

27. Which of the following Ethernet specifications is also referred to as ‘*Thinnet*’?

- a) 10BASETX
 - b) 10BASE5
 - c) 10BASE2
 - d) 10BASEFL
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28. Which of the following issues needs to be addressed when adopting *connection-oriented* services?

- a) Multiplexing
- b) Connection termination
- c) Flow control
- d) All of them

29. What is the range of addresses available for given network address of 193.100.10.0?

- a) 193.100.10.0 to 193.100.10.255
- b) 193.100.10.0 to 193.100.255.255
- c) 193.100.255.255 to 193.100.10.255
- d) 0.0.0.0 to 255.255.255.255

30. Given network address of 188.50.20.100 and a class B default mask, find the beginning network address.

- a) 188.50.255.0
 - b) 188.0.0.0
 - c) 188.50.255.255
 - d) 188.50.0.0
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SECTION B

1. a) Briefly explain the following functions performed by protocols at different levels:

- i) Connection control (2 marks)
- ii) Ordered delivery (2 marks)
- iii) Flow control (2 marks)

b) Data transmission events are commonly subjected to various distortions imposed by the transmission system. Describe the likely reasons that cause the following distortions:

- i) Impulse noise (2 marks)
- ii) Inter-modulation noise (2 marks)

(Total: 10 marks)

2. a) Describe how light rays are transmitted over the transmission medium for the *step-index* and *graded-index* multimode propagation techniques for fibre-optics. (6 marks)

b) Identify the circuits used by a private line point-to-point modem to transmit data.

(4 marks)

(Total: 10 marks)

3. a) By using decimal 13 as the divisor, determine the check digits or frame check sequence for binary data '10101101' when Cyclic Redundancy Check algorithm is used. Show the exact working in producing the required result. (7 marks)

b) Describe **three (3)** disadvantages of using *selective-Reject* ARQ compared to go-back-N error control technique. (3 marks)

(Total: 10 marks)

- 4.a) Describe briefly **three (3)** advantages of the *datagram switching* technique compared to *virtual circuit*. (3 marks)
- b) State **three (3)** performance criteria for routing techniques of packet-switching networks. (3 marks)
- c) State the advantages for using *virtual paths* for logical connections in Asynchronous Transfer Mode (ATM) transmissions. (4 marks)
- (Total: 10 marks)
5. a) What are the differences between connectionless and connection-oriented routing? (8 marks)
- b) What is a “virtual circuit”? (2 marks)
- (Total: 10 marks)
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