



UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2007/2008 – 2nd Year Examination – Semester 4

IT4503 : Data Communication and Networks
Part 1: Multiple Choice Question Paper

07th September, 2008
(ONE HOUR)

Important Instructions :

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- The paper has **25 questions** and **5 pages**.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with **one or more** correct answers.
- All questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from 0 to +1 (*All the correct choices are marked & no incorrect choices are marked*).
- Answers should be marked on the special answer sheet provided.
- Note that questions appear on both sides of the paper.
If a page is not printed, please inform the supervisor immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**

- 1) Consider the following statements on electromagnetic waves.
- (i) The amplitude of the signal always increases with the frequency.
 - (ii) The amplitude of the signal always decreases with the wavelength.
 - (iii) The frequency of signal is inversely proportional to its wavelength.

Which of them is/are correct?

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|------------------------|----------------|-----------------|
| (a) (i) only. | (b) (ii) only. | (c) (iii) only. |
| (d) (i) and (ii) only. | (e) All. | |

- 2) One of the following transmission media combinations is shown in increasing order of the bandwidth from left to right. Select that arrangement.

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| (a) Category 3 UTP, Category 5 UTP, Coaxial cables, Fiber optic cables |
| (b) Category 5 UTP, Category 3 UTP, Fiber optic cables, Coaxial cables |
| (c) Fiber optic cables, Coaxial cables, Category 5 UTP, Category 3 UTP |
| (d) Category 5 UTP, Category 3 UTP, Coaxial cables, Fiber optic cables |
| (e) Fiber optic cables, Category 3 UTP, Coaxial cables, Category 5 UTP |

- 3) What is the maximum data rate of a noisy channel with a bandwidth of 10KHz and a signal to noise ratio of 1023 ?

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|--------------|------------|-------------|---------------|-------------|
| (a) 100 Kbps | (b) 1 Kbps | (c) 20 Kbps | (d) 1023 Kbps | (e) 10 Kbps |
|--------------|------------|-------------|---------------|-------------|

- 4) Consider the following statements.

- (i) The data rate of ADSL is independent of the distance between the subscriber and the telephone exchange.
- (ii) Bluetooth is a technology widely used to provide "last mile access" solutions.
- (iii) The ADSL standard allows bandwidths higher than 2Mbps.

Which of them is/are true?

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|-----------------|--------------------------|---------------|
| (a) (iii) only. | (b) (ii) only. | (c) (i) only. |
| (d) All. | (e) (ii) and (iii) only. | |

- 5) Two computers X and Y of a network are connected by a link that has a latency of 100ms and a data rate of 10 M bits per second. This network uses a packet size of 1000 bytes. The computer X waits until it receives an acknowledgment from Y after sending a packet before sending the next packet. What is the approximate maximum possible data throughput of this system ?

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|--------------------------|----------------------------|--------------------------|
| (a) 40 K bits per second | (b) 100 K Bytes per second | (c) 8 K Bytes per second |
| (d) 20 K bits per second | (e) 10 M bits per second | |

- 6) Consider the following statements

- (i) Half duplex mode allows for two way communication.
- (ii) The Public Switched Telephone Network (PSTN) uses the half duplex mode of communication.
- (iii) Bit serial transmission mode is more suitable than the parallel transmission mode for communication over very long distances.

Which of the above is/are true?

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|------------------------|-------------------------|-----------------|
| (a) (i) only. | (b) (ii) only. | (c) (iii) only. |
| (d) (i) and (ii) only. | (e) (i) and (iii) only. | |

- 7) Consider the following statements with regard to digital multiplexing.
- (i) TDM is efficient if there is a continuous stream of data originating from the source to the destination.
 - (ii) Statistical TDM is suitable if the source produces data intermittently.
 - (iii) In Statistical TDM, a fixed time slot is allocated for each channel being multiplexed.

Which of the above is/are true?

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|------------------------|------------------------|----------------|
| (a) All. | (b) (i) only. | (c) (ii) only. |
| (d) (i) and (ii) only. | (e) (i) and (ii) only. | |

- 8) Which of the following statement(s) is/are true about the data gram mode of transmission ?

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| (a) A file transfer type application can be based on datagram mode packet forwarding. |
| (b) A DNS type application can use the datagram mode of transmission. |
| (c) Applications requiring Quality of service (QOS) are based on the datagram mode. |
| (d) The Datagram mode does not require a connection establishment phase between the sender and the receiver. |
| (e) In the datagram mode, packets do not have to carry the virtual circuit identifier (VCI) in their headers. |

- 9) What is the minimum Hamming distance of a dataword required to correct 4 errors?

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|-------|-------|-------|-------|--------|
| (a) 2 | (b) 4 | (c) 5 | (d) 9 | (e) 16 |
|-------|-------|-------|-------|--------|

Answer Question 10 and 11 based on information provided below.

A data source generates four symbols {P, Q, R, S} with the respective probabilities {0.4, 0.3, 0.2, 0.1}. Huffman coding is used to encode the symbols.

- 10) What is the Huffman code for the symbol P ?

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|-----------|----------|--------|
| (a) 01010 | (b) 1010 | (c) 11 |
| (d) 0 | (e) 101 | |

- 11) What is the Huffman code for the symbol S ?

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|---------------|------------|-------------|
| (a) 111 | (b) 010101 | (c) 1111111 |
| (d) 000111000 | (e) 0 | |

- 12) A data communication system uses 8 bit words as messages with one parity bit and even parity is used. Following are some words received by the receiver.

- (i) 11010101
- (ii) 11111111
- (iii) 11111110

Which of them indicate(s) an error ?

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|-------------------------|------------------------|--------------------------|
| (a) (i) only. | (b) (i) and (ii) only. | (c) (ii) and (iii) only. |
| (d) (i) and (iii) only. | (e) All. | |

13) What is the logical topology of an Ethernet LAN connected through a hub ?

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|----------|----------|----------|
| (a) Bus | (b) Mesh | (c) Grid |
| (d) Star | (e) Ring | |

14) What is/are the layer(s) in the OSI model which correspond(s) to the Host-to-Network layer in the TCP/IP model ?

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|------------------------|-----------------------|--------------|
| (a) Physical layer | (b) Data link layer | (c) IP layer |
| (d) Presentation layer | (e) Application layer | |

15) Which of the following addresses is/are valid IP addresses of a machine(s) in a network with the subnet mask 255.255.255.0 ?

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|--------------------|--------------------|------------------|
| (a) 192.248.16.89 | (b) 192.248.16.258 | (c) 192.248.16.0 |
| (d) 192.248.16.255 | (e) 127.0.0.100 | |

16) Identify the network in CIDR notation, with the IP address range 10.100.8.0 – 10.100.15.255.

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|---------------------|--------------------|--------------------|
| (a) 10.100.8.0/21 | (b) 10.100.15.0/22 | (c) 10.100.15.0/20 |
| (d) 10.100.8.255/22 | (e) 10.100.8.0/24 | |

17) Which of the following is/are true with respect to the TCP/IP protocol stack ?

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| (a) TCP guarantees a constant data rate between the source and the destination. |
| (b) UDP does not use application process port numbers. |
| (c) UDP does not provide an end to end error recovery mechanism. |
| (d) TCP guarantees insequence delivery of packets at the receiver. |
| (e) TCP is the most suitable transport protocol to carry real time traffic. |

18) A TCP connection experiences a packet loss when the congestion window is 8192 bytes and the window threshold is 64KB. What should be the new value of the window threshold after the packet loss ?

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|----------------|-----------------|-----------|
| (a) 4096 Bytes | (b) 8192 Bytes | (c) 64 KB |
| (d) 1 Byte | (e) 16384 Bytes | |

19) Which of the following statements is/are true about the congestion control mechanisms in the TCP?

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| (a) During the congestion avoidance phase, the TCP congestion window grows linearly. |
| (b) During the slow start phase, the TCP congestion window grows exponentially. |
| (c) Threshold increases with each acknowledged packet. |
| (d) There is no relationship between the congestion window and the threshold. |
| (e) TCP uses timeouts to detect packet losses. |

20) Which of the following statements is/are true?

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| (a) The physical topology of an Ethernet LAN connected through a Hub, is a star. |
| (b) The physical and logical topologies of a LAN are always identical. |
| (c) An Ethernet switch forwards incoming frames from one port to all the other ports. |
| (d) Ethernet hubs and switches have identical functionalities except for the maximum data rates which can be handled. |
| (e) An Ethernet hub is a passive device and does not require power to operate. |

21) Let the Maximum expected throughput (in packet per packet time) of Pure Aloha, Slotted Aloha, 1-Persistent CSMA and 0.5-Persistent CSMA be P , Q , R and S respectively. Which of the following statements is/are correct ?

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|--------------|---------------------|-------------|
| (a) $Q = 2P$ | (b) $Q < R$ | (c) $R < S$ |
| (d) $Q = S$ | (e) $P < Q < R < S$ | |

22) The expected throughput of a Pure Aloha network at the offered load of G is S . Which of the following statements is/are true?

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| (a) When G is 0.5, S is 0.18. | (b) When G is 0.6, S is 0.60. |
| (c) When G is 0.4, S is 0.70. | (d) When G is 0.7, S is less than 0.18. |
| (e) S is always less than or equal to 0.18 irrespective of G . | |

23) Three wireless stations A , B and C are placed in a straight line. Both A and C are within the radio range of B , but A and C are not within the radio ranges of each other. Which of the following statements is/are correct about this scenario ?

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| (a) Both A and C can send messages to B simultaneously and B can receive the message. |
| (b) B can send a message to A while C is transmitting. |
| (c) B can send a message to C while A is transmitting. |
| (d) Using the RTS/CTS protocol, it is possible for A to inform C not to transmit while it is sending a message to B . |
| (e) If A wants to send a message to B , then A should wait for an RTS message from B . |

24) The network N , which uses private IP addresses for its hosts, is connected to the Internet through a gateway W . Which of the following statements is/are true about this scenario?

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| (a) By using Network Address Translation (NAT) on W , it is possible to give Internet access to machines on N . |
| (b) Network Address Translation can only be used to provide access to HTTP servers outside N . |
| (c) If W is configured for Network Address Translation, the IP addresses of the machines on N are not visible to those outside N . |
| (d) It is possible to allow the machines on N to communicate with any other machine on the Internet by running an HTTP Proxy server on W . |
| (e) If W is running an HTTP proxy server, the IP addresses of the machines on N are visible to those on the Internet. |

25) Which of the following statements is/are true about the SNMP?

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| (a) SNMP operates over UDP. |
| (b) SNMP is a connection oriented protocol. |
| (c) SNMP's "get" capability enables a management station to retrieve the values of objects at the agent. |
| (d) SNMP agents can send unsolicited notifications to the management station. |
| (e) SNMP is not suitable to be run on a Personal Computer. |
