



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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| <ul style="list-style-type: none"> (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. |
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- 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. |
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- 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. |
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- 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. |
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- 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. |
