DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY
Academic Year 2009/2010 – 2nd Year Examination – Semester 4

IT4503: Data Communication and Networks
Part 2: Structured Question Paper

15th August, 2010
(ONE HOUR)

To be completed by the candidate

BIT Examination Index No: _____

Important Instructions:

- The duration of the paper is **1 (one) hour**.

- The medium of instruction and questions is English.

- This paper has **3 questions** and **6 pages**.

- **Answer all questions.**

- **Questions 1 and 2 (60% marks), question 3 (40% marks).**

- **Write your answers** in English using the space provided **in this question paper**.

- Do not tear off any part of this answer book.

- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.

- Note that questions appear on both sides of the paper.
  If a page is not printed, please inform the supervisor immediately.

Questions Answered
Indicate by a cross (✗), (e.g. ☒) the numbers of the questions answered.

To be completed by the candidate by marking a cross (✗).	Question numbers		
	1	2	3
To be completed by the examiners:				

1) (a) With regards to packet forwarding policy, what is the main difference between an Ethernet hub and an Ethernet switch?

[8 Marks]

ANSWER IN THIS BOX

Ethernet hub broadcasts incoming messages to all the ports but an,

Ethernet switch forwards the incoming packet only to the receivers port.

(b) What is the reason to have twisted copper wires in cables such UTP cables used for data transmission?
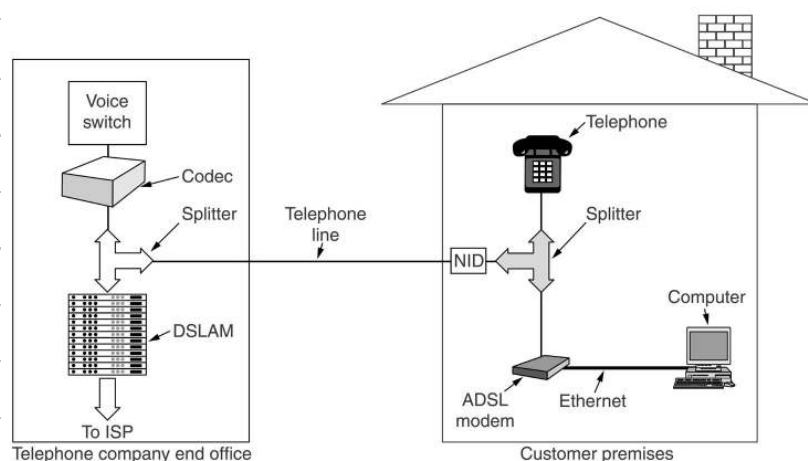
[5 Marks]

ANSWER IN THIS BOX

When wires are twisted they radiate less.

(c) Draw a diagram to illustrate how an ADSL modem, a Splitter, a Telephone and a Computer are used in a typical home voice/data connection over the PSTN.

[12 Marks]

ANSWER IN THIS BOX

(d) The bandwidth allocated for the channel from the customer to the telephone company on an ADSL link is **U Hz** and the bandwidth allocated for the channel in the reverse direction is **D Hz**. State a relationship between **U** and **D**.

[5 marks]

> **ANSWER IN THIS BOX**
>
> **D > U**

2   (a) A network uses 255.255.240.0 as its subnet mask. The default router for this network is 10.16.63.254. Find the network address and the maximum number of hosts that can be on this network.

[8 Marks]

> **ANSWER IN THIS BOX**
>
> **Network address :- 10.16.48.0/20**
>
> **number of hosts 4096 – 2 = 4094**

(b) A network administrator decides to deploy several subnets with each having a maximum of 30 hosts using the IP address range 192.248.16.0 - 192.248.16.255. What should be the subnet mask used by these subnets?

[5 marks]

> **ANSWER IN THIS BOX**
>
> **255.255.255.224**

(c) A network uses the IP address range 10.16.50.0/24. It is connected to the Internet through a NAT box with two IP addresses; 10.16.50.254 and 192.248.17.2. A host 10.16.50.10 creates a TCP connection to 220.247.224.92. What is the source IP address of the packets arriving at 220.247.224.92 on this connection? Explain your answer.

[10 marks]

ANSWER IN THIS BOX

192.248.17.2

10.16.50.10 is a private IP address. The NAT box rewrites the packets

from it by replacing the source address with the address of the public

interface of the NAT.

(d) Describe two advantages of connecting a LAN to the public Internet using a web proxy.

[7 marks]

ANSWER IN THIS BOX

1. Bandwidth can be conserved

2. Improve the security by not exposing the LAN to the public Internet

directly.

4

3   (a) Describe the slow start algorithm used in TCP.

[12 Marks]

ANSWER IN THIS BOX

Set the initial congestion window to 1 segment. Send window size worth of data in one burst. For each segment acknowledged increase the window size by 1. Decrease the window size back to 1 after a time-out. This has the effect of increasing the window size exponentially.

(b) Calculate the CKC checksum for the frame 1101011011, if the generator polynomial $G(x)$ is $x^4 + x + 1.$

[10 marks]

ANSWER IN THIS BOX

1110

Frame : 11010110111110

(c) (i) What is the minimum Hamming distance required to **correct** 2 errors?
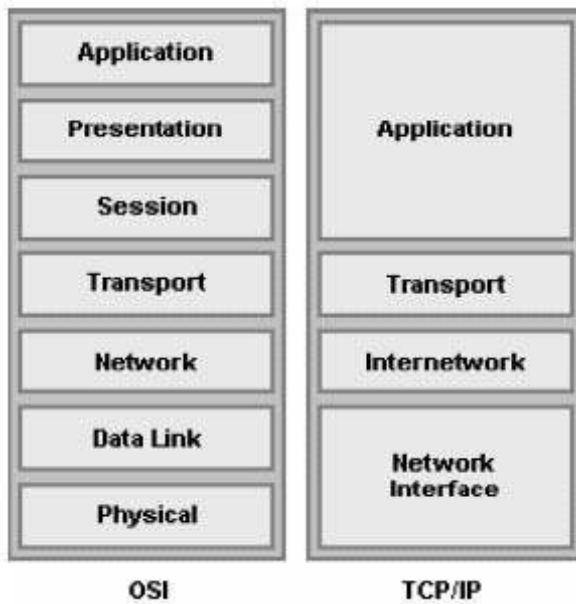
[6 marks]

ANSWER IN THIS BOX

5

(ii) Draw a diagram to depict the TCP/IP reference model and name the corresponding layers in the OSI reference model.

[6 marks]

ANSWER IN THIS BOX

OSI	TCP/IP
Application	
Presentation	Application
Session	
Transport	Transport
Network	Internetwork
Data Link	Network Interface
Physical	

(d) What is the minimum bandwidth required to transmit data at the rate of 1Mbps over a noisy channel with a signal to noise ratio (S/N) of 1023?

[6 marks]

ANSWER IN THIS BOX

100 KHz

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