Name: Tsoi Yiu Chik Subject Code: SEHH2238

Student ID: 20195601A Lecture Group: 202

SEHH2238 Computer Networking
Mid-term Test – Answer Sheet

Instruction to Students:

1. **Answer ALL questions**.
2. Fill your personal particulars in the header of this answer sheet.
3. Insert your answer into the space provided in this answer sheet.
4. Show your work clearly and neatly. Marks will be deducted for untidy work.
5. Upon completion, save a copy of this file into **PDF file format**.
6. **Upload the PDF file** to the submission link on Moodle within the **15-minute submission grace period**.

Important:

Ensure the originality of your work. Any form of plagiarism is subject to disciplinary actions such as mark deduction, disqualification or even expulsion by the College.

(Please refer to the relevant section(s) on plagiarism of the Student Handbook.)

For Markers Only	
Question	**Mark**
1	25
2	25
3	5
4	23
Total	78

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Answer for Question 1

25 /25

A)
Total power change = -0.6 * 16 = -9.6dB

We have:

$-9.6 = 10 \log_{10} (0.5644/P_1)$

$P_1 = 5.1474$ mW (4 d.p.)

B)
Max data rate = 24Kbps
Bandwidth = 13kHz

Using the Shannon Capacity equation, we have:

$24*1000 = 13*1000 *\log_2(1+SNR)$
$24/13 = \log_2(1+SNR)$
SNR = 2.5954 (4 d.p.)

By applying SNR equation:
$SNR = P_1/Noise$
$Noise = P_1/ SNR = 1.9833$ (4 d.p.)

C)
Distortion may be one of the factors altering the signal, it changes its form or shape. Distortion can be caused by the difference in delay of different frequency components.

D)
i)
"W" and "4" in 7-bit ASCII, presented in binary:

"W" = 1010111, "4" = 0110100
Data word of "W4": 1010111 0110100
ii)

Zero added dataword: 10101110110100000

Polynomial is: 10100

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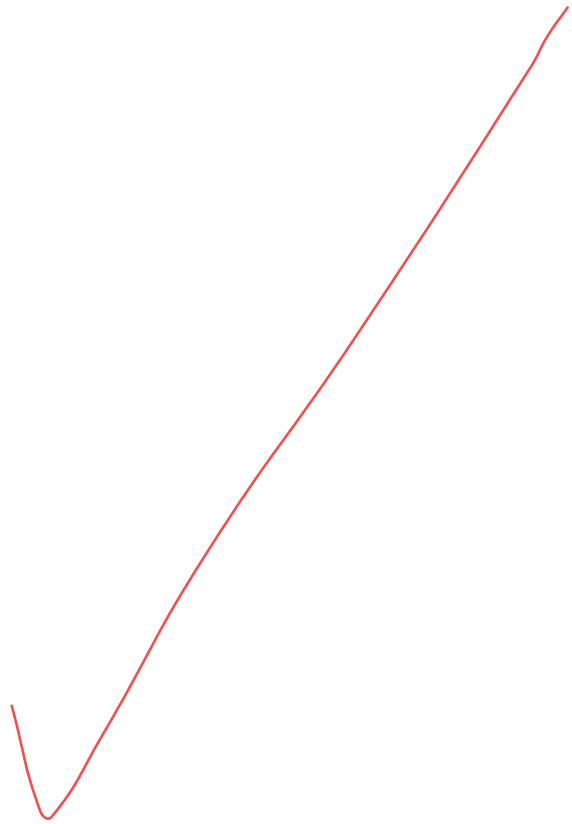
```
                10001101101111
10100 |101011101101000000
        10100
         00011
         00000
          00111
          00000
           01110
           00000
            11101
            10100
             10011
             10100
              01110
              00000
               11101
               10100
                10010
                10100
                 01100
                 00000
                  11000
                  10100
                   11000
                   10100
                    11000
                    10100
                     11000
                     10100
                      1100
```

remainder is: 1100

codeword is: 101011101101001100



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Answer for Question 2

25 /25

A)
The sender sends one frame and waits for an ACK before sending the next frame
If no ACK is received after timeout, the sender retransmits the frame

B)
Transmission time of the data frame:
900/1.2M = 750 μs

ACK transmission time = 0

Propagation time:
(2000 * 1000)/(1.3 x 10^8) = 15.384615 ms

Total delay of sending a frame = 750 μs + 0 + 15.384615ms* 2 = 31.5192 ms

C)
Total frame of 900bit = 1777
Last frame size = 700 bit

For the first 1777 frames, delay:
31.5192 ms * 1777 = 56.0096 s

For the last frame, delay =
Tp: 700/1.2M = 583.3333 μs
583.3333 μs + 0 + 15.384615ms* 2 = 31.35256 ms

Total delay of 1.6Mb = 56.0096 s + 31.35256 ms = 56.0410s (4d.p.)

D)
In 1777 frames, there are ⌊ 1777 / 10 ⌋ x 1 = 177 lost, and 7 frames remaining
In 184 frames, there are ⌊ 184 / 10 ⌋ x 1 = 18 lost, and 4 frames remaining
In 22 frames, there are ⌊ 22 / 10 ⌋ x 1 = 2 lost, and 2 frames remaining
In 2 + 2 = 4 frames < 10 frames, no lost happens
No. of frame lost = 197

Total delay = 56.0410s + 130ms * 197 = 81.6510s

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Answer for Question 3

5 /25

A)

For non-persistant, stations backoff when it senses the channel is busy

For 1-persistant, stations keep sensing the availability of the channel, if it is free, send the data.

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B)

i)

ii)

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Answer for Question 4

23 /25

A)

i)

11111111.11111111.11000000.000000

255.255.192.0

ii)

10.121.128.0

00001010.01111001.10 000000.00000000

iii)

10.121.191.255

00001010.01111001.10 111111.11111111

iv)

10.121.128.1 to 10.121.191.254

B)

500 bit transmission time:

500/2M = 250 μs

Propagation time = 4000*1000 / 2x10^8 = 0.02s

90000 bit transmission time:

90000/2M = 0.045s

Total delay =(250 μs + 0.02s)* 2 + (0.045s + 0.02s) + (250 μs + 0.02s)* 3 = 0.1625s

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