ASSIGNMENT/ASSESSMENT ITEM COVER SHEET

Student Name:

              FIRST NAME   **FAMILY / LAST NAME**

Student Number: Email:

Course Code   Course Title

(Example)

A	B	C	D	1	2	3	4

(Example)

Intro to University

Campus of Study: (eg Callaghan, Ourimbah, Port Macquarie)

Assessment Item Title: Due Date/Time:

Tutorial Group (If applicable):   Word Count (If applicable):

Lecturer/Tutor Name:

Extension Granted: Yes   No   Granted Until:

Please attach a copy of your extension approval

NB: STUDENTS MAY EXPECT THAT THIS ASSIGNMENT WILL BE RETURNED WITHIN 3 WEEKS OF THE DUE DATE OF SUBMISSION

Please tick box if applicable

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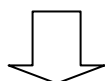
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Assignment 1 – SENG3500

1. a.   No. of packets   = Amount of data generated / packet size / seconds per minute
                            $= 10 \cdot 10^6 / (2000\text{-}20) \cdot 8 / 60$
                            $= 10.522\ldots$
                            $= 10$

    b. L_{delay} $= (x / L_{link}) + (P_{bits} / L_{trans})$
         $0.004 = (x / 20 \cdot 10^6) + (2000 \cdot 8/(10 \cdot 10^6 / 60))$
         $0.004 = (x / 20 \cdot 10^6) + 0.096$

    c. $10 \cdot (20 \cdot 8) = $ **1600 bps**

2. a. R_A = Total bits + packets
         $R_A = (200000 \cdot 8) + ((200000/1560) \cdot 40 \cdot 8)$
             = **1.641 Mbps**
         $R_B = (145000 \cdot 8) + ((145000/1560) \cdot 40 \cdot 8)$
             = **1.19 Mbps**

    b. $P_{router} = ((1.6 + 1.16 \cdot 1000000)) / (3960 \cdot 8)$
                = $88.41\ldots$
                = **88 packets**

    c. $T_{link3} = 88 \cdot (4000 \cdot 8)$
                = **2.816 Mbps**

3. a. N_{circ} $= R_{link} / R_{user}$
                = 4 Mbps / 0.2Mbps
         = **20 users max.**

    b. P_{prob} (x=4) = prob. of 4 current users, n_{pop} = total pop., k_{curr} = current pop., p_{prob} = trans. prob.

         Add the probabilities that there are 1, 2, 3 and 4 users active.

         $P_{prob} = (^{20}_4) \cdot 0.15^4 \cdot (1\text{-}0.15)^{20\text{-}4} +$
                 $(^{20}_3) \cdot 0.15^3 \cdot (1\text{-}0.15)^{20\text{-}3} +$
                 $(^{20}_2) \cdot 0.15^2 \cdot (1\text{-}0.15)^{20\text{-}2} +$
                 $(^{20}_1) \cdot 0.15^1 \cdot (1\text{-}0.15)^{20\text{-}1}$

             $= (4845 \cdot 0.00051 \cdot 0.07425) +$
               $(1140 \cdot 0.00338 \cdot 0.06311) +$
               $(190 \cdot 0.0225 \cdot 0.05365) +$
               $(20 \cdot 0.15 \cdot 0.04560)$

             $= 0.18347 + 0.24317 + 0.22935 + 0.1368$
             $= 0.79279$
             = **79.28%**

4.   a. $R_{bits/sec}$ = 2048*8/0.04 * 2
                = 819200
                = **0.8192 Mbps**

  b.

  c. D_{trans} = 2000 B / 0.8192 Mbps
             = 19.531 ms
      D_{prop} = 50 km / $3*10^8$ m/s
             = 0.167 ms
      D_{total} = D_{trans} + D_{prop}
             = **19.698 ms**

5.   a. $A_{bits/sample}$ = 16, $S_{samples/sec}$ = 44000
      $T_{bit\ rate}$ = 16 * 44000 * 2
             = **1408 kbps**

  b.

  c. $T_{data\ size}$ = data transmitted in 500 ms in bytes
      $T_{data\ size}$ = ((1408 / 8) * 1000) / 2
             = 88000 bytes
      $T_{packets}$ = 88000 / (800 - 8 - 20 - 18)
             = 116.711…
             = **117 packets**

  d. T_{trans} = ($T_{data\ size}$ * 8) / $T_{bit\ rate}$ * 1000)
      T_{trans} = 88000*8 / (1408*1000)
             = 0.5
      T_{prop} = $D_{distance}$ = S_{speed}
      T_{prop} = 100*1000 / $3*10^8$
             = 0.00033…
      T_{delay} = 0.5 + 0.00033
             = **0.50033 ms**

6.   a.   Polar NRZ

  b.   Bipolar

  c.   Manchester

  d.   Differential Manchester
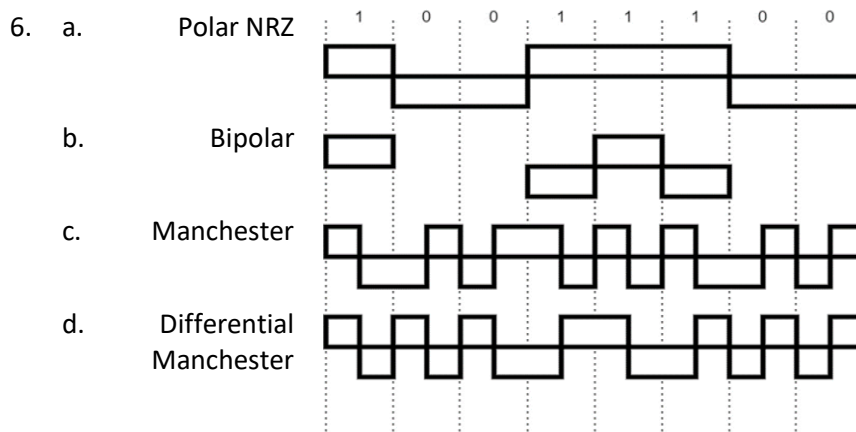
7.   a. N_{home} = 200, t_{int} = 200, length = 2500
      λ_{sec} = 1 / $(200*10^{-6})$ = 5000
      λ_{hour} = 5000 * 3600 = **$18*10^6$**

  b. $\lambda_{bits/sec}$ = 5000 * (2500*8) = $10*10^7$ = **0.1 Gb/s**

c. $p = \lambda / \mu$ λ = 5000 packets/sec
                                          $\mu = R_{Link}/L_{packet\ bits}$
                                          $\mu = 2*10^9 / 2500 * 8$
     p = 5000 / 100000   = 100000 packets/sec
        = **0.05**

d. $D = [p / (1- p)] (1 / \mu) + (1 / \mu)$
        = [0.05 / 0.95] 1/100000 + 1/100000
        = 0.05263 / 100000 + $1*10^5$
        = $1.053*10^{-5} + 1*10^{-5}$
        = $2.053*10^{-5}$
        = **20.53 µs**