Curtin University

EXAMINATION PAPER CHECKLIST

for examination CNCO2000 Computer Communications

This page is to remain part of your examination file and is to be submitted with your Examination Cover Sheet and content. This page is for information only and will not be printed.

☐ Questions for the examination commence on page 3 (following the Examination Paper Checklist and Examination Cover Sheet) – Questions page should state page 1 of X.

☐ Ensure type of examination is correct 'CLOSED, OPEN OR RESTRICTED'
  o CLOSED - no text books or written materials permitted
  o OPEN - any text books or written materials permitted
  o RESTRICTED - specified text book or written material only permitted

☐ All pages, sections and questions are numbered sequentially i.e. pages, Part A, B, C, … etc. Questions 1, 2, 3, … Subsections to question numbering is to be consistent throughout the examination paper i.e. (a), (b), (c), …

☐ General instructions to students are to be entered in the 'Instructions to Students' area of the online exam request and is reflected on the Exam Cover Sheet

☐ If there is insufficient space to enter all the general instructions to students in the 'Instructions to Students' section of the Exam Cover Sheet, the top section of page 2 may be used, preceding the commencement of the examination questions

☐ Instructions regarding the answering of questions are communicated clearly to students. e.g. Answer Part A in the answer book provided and Part B on the examination paper

☐ All questions, including subsections and parts of questions are to have marks allocated clearly. The total of all marks is to agree with the Total marks on the Exam Cover Sheet

☐ 'END OF EXAMINATION PAPER' is to be stated on the last page of the examination paper

☐ Student Name and ID is only required if the student answers on the examination paper or if the School wishes the paper to be returned

☐ Exam paper is of a high quality readable format, e.g. consistent formatting through entire document, no blurred text, images clear and printable.

The examination paper has been proof read, the above checks completed, and approved for submission.

	NAME OR ELECTRONIC SIGNATURE	DATE
EXAMINER		
CO-EXAMINER		
HEAD OF SCHOOL/DEPARTMENT (OR DELEGATE)		

Venue   _____

Curtin University

Student Number |__|__|__|__|__|__|__|

Family Name   _____

First Name   _____

School of Electrical Engineering, Computing and Mathematical Sciences

EXAMINATION

End of Semester 1, 2019

CNCO2000 Computer Communications

CMPE3000 Data Communications & Networking

CMPE2000 Data Communications & Network Management

This is a RESTRICTED BOOK examination

Examination paper IS NOT to be released to student

Examination Duration   2 hours

Reading Time

10 minutes

Notes in the margins of exam paper may be written by Students during reading time

Total Marks

100

Supplied by the University

None

Supplied by the Student

Materials

One A4 sheet of handwritten notes (both sides)

Calculator

A non-programmable calculator is permitted in this exam

Instructions to Students

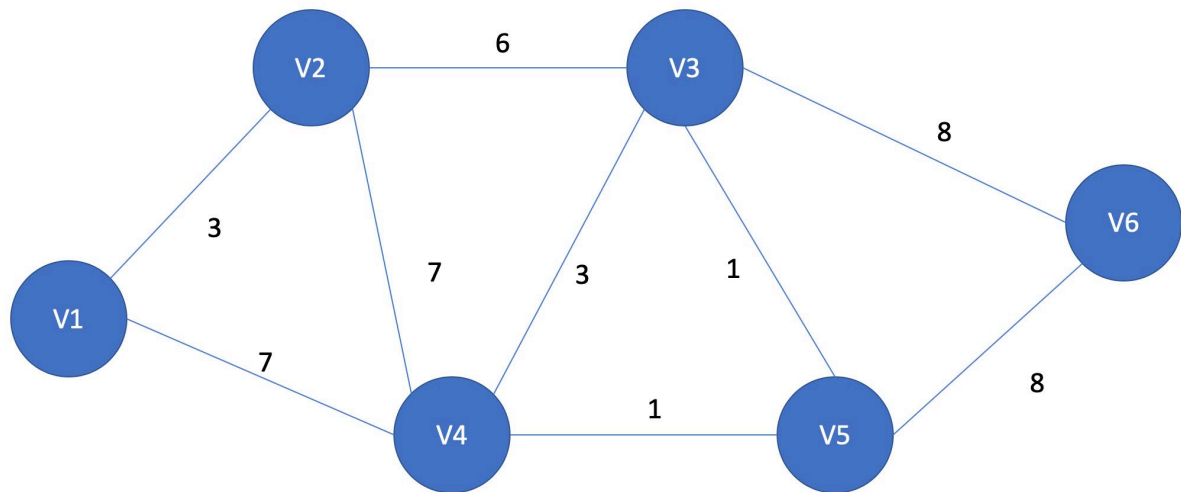Answer all questions in the space provided below each question.

For Examiner Use Only

| Q	Mark
1	
2	
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18	

Total _____

Question 1 (35 Marks)

a) Refer to the figure below. Use Dijkstra's algorithm to generate a least-cost route for V1 to all other nodes. Show each step clearly.

(10 marks)

b) Refer to the diagram below. The link from router C to router D fails, explain how this may cause the "count to infinity" problem in a distance vector routing protocol. Illustrate your answer with the routing tables in the effected routers.
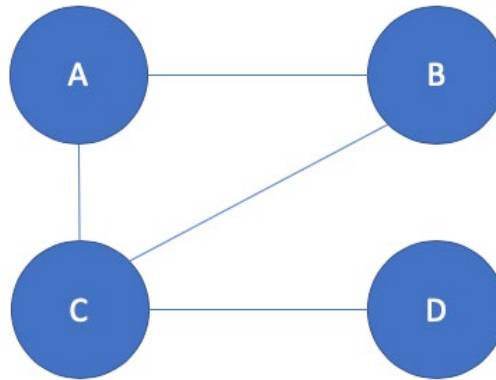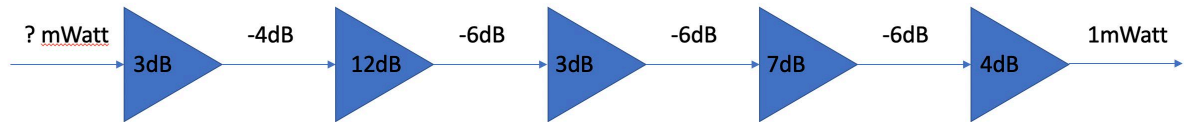

Routing tables

	A	B	C	D
A	-	1	1	2 (via C)
B	1	-	1	2 (via C)
C	1	1	-	1
D	2 (via C)	2 (via C)	1	-

(10 marks)

(Blank space for additional work)

c) Given the transmission line below;

? mWatt → 3dB → -4dB → 12dB → -6dB → 3dB → -6dB → 7dB → -6dB → 4dB → 1mWatt

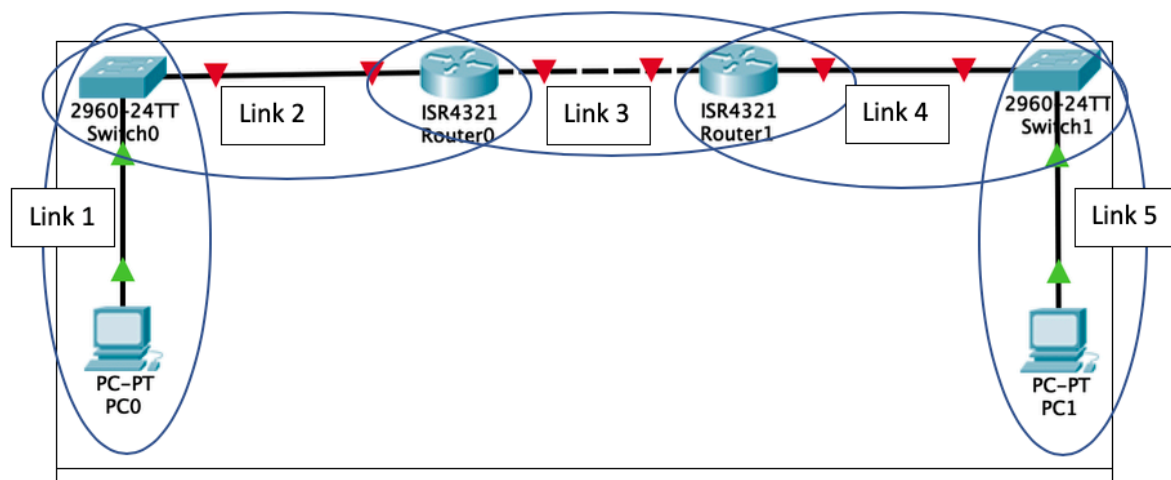i.   Calculate the overall gain or loss of the system (in dB)

(2 marks)

ii.   If the required output is 1 milliwatt, what should the input power be?

(3 marks)

d) Consider the network diagram below consisting of 5 links and 3 subnets. If PC0 sends an IP packet to PC1, what are the source and destination MAC and IP addresses on each link?

(10 marks)

	MAC	IP
PC0	AA:AA:AA:AA:AA:AA	10.1.1.1
Switch 0 (PC side)	BB:BB:BB:BB:BB:BB	110.1.1.2
Router0 (Switch side)	CC:CC:CC:CC:CC:CC	10.1.1.3
Router0 (WAN side)	DD:DD:DD:DD:DD:DD	10.1.2.1
Router1 (WAN side)	EE:EE:EE:EE:EE:EE	10.1.2.2
Router1 (Switch side)	11:11:11:11:11:11	10.1.3.1
Switch 1 (PC side)	22:22:22:22:22:22	10.1.3.2
PC1	33:33:33:33:33:33	10.1.3.3

Complete the table below:

	Source MAC Addr.	Dest. Mac Addr	Source IP addr	Dest. IP Addr
Link 1	AA:AA:AA:AA:AA:AA		10.1.1.1	
Link 2				
Link 3				
Link 4				
Link 5		33:33:33:33:33:33		10.1.3.3

Question 2 (15 Marks)

a) Briefly describe the Pure Aloha protocol. Illustrate your answer with a timing diagram showing the vulnerability time.

(3 marks)

b) Slotted Aloha increase the maximum possible throughput when compared to Pure Aloha. Briefly describe how this is achieved, illustrate your answer with a timing diagram indicating the vulnerability times.
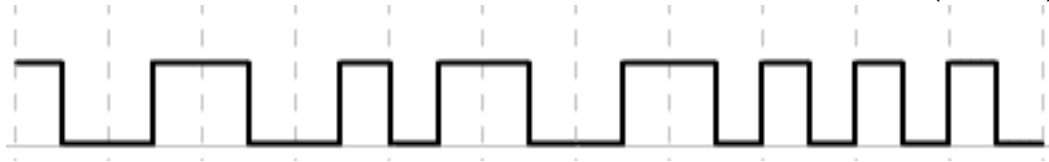
(4 marks)

c) What is ARP (Address Resolution Protocol)? Briefly explain how ARP works in Ethernet.

(4 marks)

d) Refer to the image below.

i. If <u>Manchester</u> encoding is used, decipher the bitstream (data) contained in the transmission. (dotted lines mark bit times) Explain your method.

(2 marks)

ii. Refer to the image below. If <u>MLT3</u> encoding is used, decipher the bitstream (data) contained in the transmission. (dotted lines mark bit times) Explain your method.
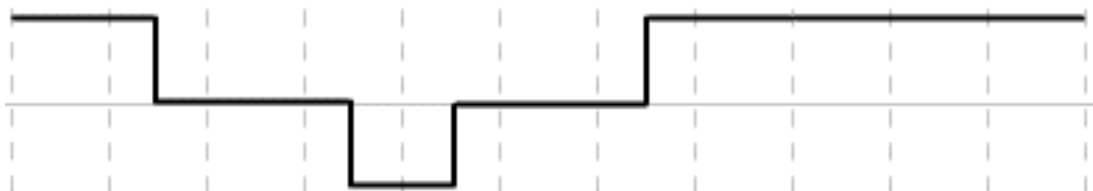
(2 marks)

Question 3 (15 marks)

For the bit stream:

11010110 00111001

(a) What's the string being delivered if single bit **odd** parity check is used?

(1 mark)

(b) For the same bit stream, what's the string being delivered if the original string is organized into 4-bit block and two-dimensional **even** parity check is used?

(2 marks)

(c) For the same bit stream, what's the string being delivered if the original string is organized into 4-bit block and checksum is used?

(3 marks)

(d) If CRC check is used and the generator polynomial $G(x) = x^3 + 1$, find the string being delivered (code word) $F(x)$?

(9 marks)

Question 4 (20 marks)

Consider the case of transmitting **1000-bit frames** over on a **10 Mbps link** with a delay of **10ms (millisecond)**. The probability that a single frame is in **error is 0.16**
What is the *maximum link utilization* for:

    (a) Stop-and-wait flow control?

<div align="right">(5 marks)</div>

    (b) Sliding window with a window size of 8 (If selective reject ARQ is used)?

<div align="right">(5 marks)</div>

    (c) Sliding window with a window size of 201 (If selective reject ARQ is used)?

<div align="right">(5 marks)</div>

    (d) Sliding window with a window size of 256 (If Go-back-N ARQ is used)?

<div align="right">(5 marks)</div>

Question 5 (15 marks)

Consider a sliding window protocol used for flow control on a given data link where the data rate is 7,000 bits/second, the propagation delay is 90milliseconds, and the frame size is 2400 bits per frame. Assume that acknowledgment packets are of negligible size, processing time at the hosts is negligible, and the link is error is 0.5.

(a) Can the link be fully utilized? Explain?

(5 marks)

(b) What is the maximum utilization of the link that is possible?

(5 marks)

(c) What is the minimum window size which will allow the maximum utilization found in Question (b)?

(5 marks)

END OF EXAMINATION