Name..... **Student ID.....**

THE UNIVERSITY OF AUCKLAND

Department of Computer Science

COMPSCI 314 FC 2003 : Test

Monday May 5 2003, 7.30 pm.

TOTAL	

- Attempt all questions
- Time allowed 1 hour : total marks = **50**
- Answer questions in the spaces provided on the question paper
- Approximate calculations only are needed – no calculators allowed
- Space for extra answers is at the end of this question/answer paper
- You must show working – no working may mean no marks.

1. An LZW compressor has its dictionary initialised to the values 0…255 and is then used to compress the string `orongorongo*.` (The * here acts as a END marker.)
Show the entries that are added to the dictionary (indices and phrases) by this compression.

You should not show the full compressor output.

Question = 6 marks

CONTINUED

2. Many communications protocols involve sending a message and waiting for a reply before sending anything more. What features should the protocol include to protect against –

(i) One or more bits being corrupted in a message, and

[1 mark]

(ii) Receiving no reply or acknowledgement to a message.

[1 mark]

(iii) What two situations might result from not receiving a reply and not recovering properly? Explain how each situation arises.

[4 marks]

Question = 6 marks

CONTINUED

3. In "classic" 10BASE5 Ethernet, a single cable has a maximum length of 500 metres, and cables may be linked by repeaters to form a segment with a maximum distance between stations of 3 000 metres.
Assuming that signals on the cable travel at 200 metres/μs, what is the latest part of an Ethernet frame where a collision may occur on –

(i) a single cable

[4 marks]

(ii) a segment (ignore repeater delays)

[4 marks]

(iii) Hence or otherwise comment on the statement "Ethernet is inefficient because so much user data is lost from collisions and must be retransmitted."

[4 marks]

Question = 12 marks

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4. A packet on an IEEE 802.3 *or* Ethernet network is seen to start with the following octets. (*These octets do not include the preamble and start delimiter.*

Below each octet is a sequential number so that you can identify it in your answers.)

00	00	66	33	B5	49	00	00	A7	12	36	B7	00	60	AA	AA	03	00	00	00	08	00	48	45	4C	4C
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

(i) Identify the major fields of this record, showing for each the range of octet numbers.

Field name	Field bits or value	octet range

[6 marks]

(ii) State whether this record is in Ethernet format or IEEE 802.3 format, and why.

[2 marks]

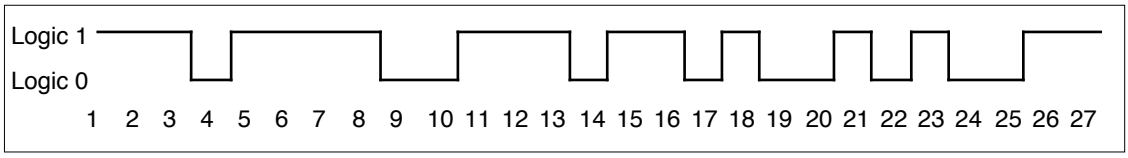
(iii) What changes, if any, might be seen if the record was coded for 802.3 rather than Ethernet? (or vice versa, as the case may be)

[2 marks]

Question = 10 marks

CONTINUED

5. The diagram shows the waveforms of some characters encoded for asynchronous transmission. The characters are known to be 7-bit ASCII, with one parity bit. Assume that the signal has been steady for some time before the waveform shown.



Give the requested information about these characters and their coding.
A table of the ASCII character set is at the end of the question.
Each bit-time is identified by a number, which should be used to specify the bit.

i	The start bit number of the *first* character	1 mark	
ii	The stop bit number of the *first* character	1 mark	
iii	The start bit number of the *second* character	1 mark	
iv	The parity bit number of the *third* character (yes, the 3rd)	1 mark	
v	The *first* character (its symbol, such as 'A')	1 mark	
vi	The *second* character (its symbol, such as 'Z')	1 mark	
vii	The parity rule used for *both* characters	2 marks	

binary	hex	000	001	010	011	100	101	110	111
0000	**0**	NUL	DLE	SP	0	@	P	`	p
0001	**1**	SOH	DC1	!	1	A	Q	a	q
0010	**2**	STX	DC2	"	2	B	R	b	r
0011	**3**	ETX	DC3	#	3	C	S	c	s
0100	**4**	EOT	DC4	$	4	D	T	d	t
0101	**5**	ENQ	NAK	%	5	E	U	e	u
0110	**6**	ACK	SYN	&	6	F	V	f	v
0111	**7**	BEL	ETB	'	7	G	W	g	w
1000	**8**	BS	CAN	(	8	H	X	h	x
1001	**9**	HT	EM	)	9	I	Y	i	y
1010	**A**	LF	SUB	*	:	J	Z	j	z
1011	**B**	VT	ESC	+	;	K	[	k	{
1100	**C**	FF	FS	,	<	L	\	l	|
1101	**D**	CR	GS	-	=	M	]	m	}
1110	**E**	SO	RS	.	>	N	^	n	~
1111	**F**	SI	US	/	?	O	_	o	DEL

Question = 8 marks

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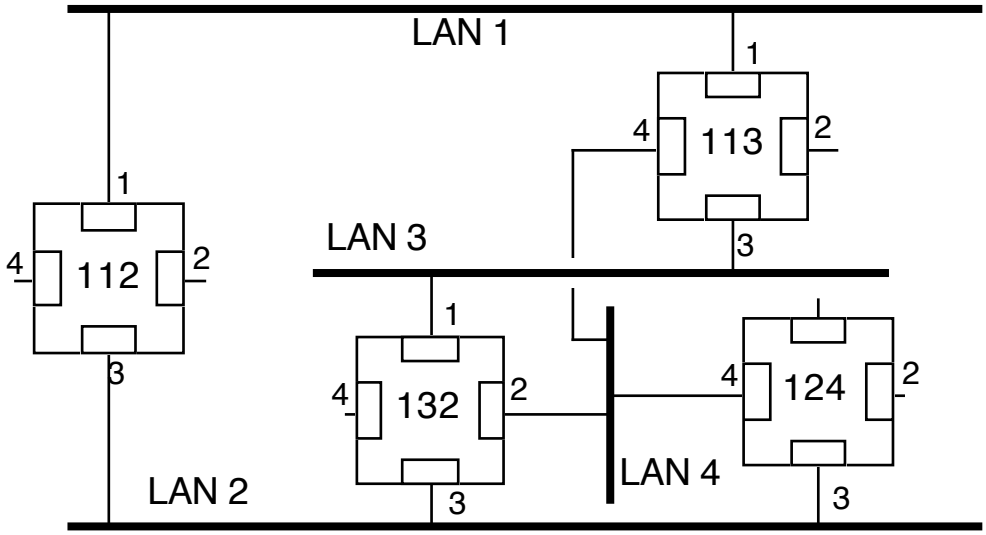
6. The diagram shows four LANs fully interconnected by bridges.
Each bridge is identified by the numbers shown within it (such as 113) and all bridges have the same priority. (Bridge 113, Port 4 is connected to LAN 4.)
Ports are numbered as shown and all ports have the same cost (which may be taken as 1).



(i) Which is the root bridge, and why?

[2 marks]

(ii) Determine the spanning tree for this network.
This answer may continue onto the following page

[6 marks]

Question = 8 marks

More space for the answer to Question 6 (ii), and others

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Work space and extra answers for all questions