Uva Wellassa University of Sri Lanka

Faculty of Science and Technology

Department of Computer Science & Technology

1st Semester Examination March/April 2013

CST 241-3/ SCT 377-3 Data Communication and Networking

PART - B

Time Duration : Two Hours (02 hrs.)

Number of Questions : Four (04)

Answer All Questions.

1.

a. List the types of line coding schemes with one example for each code. **(6 mark)**

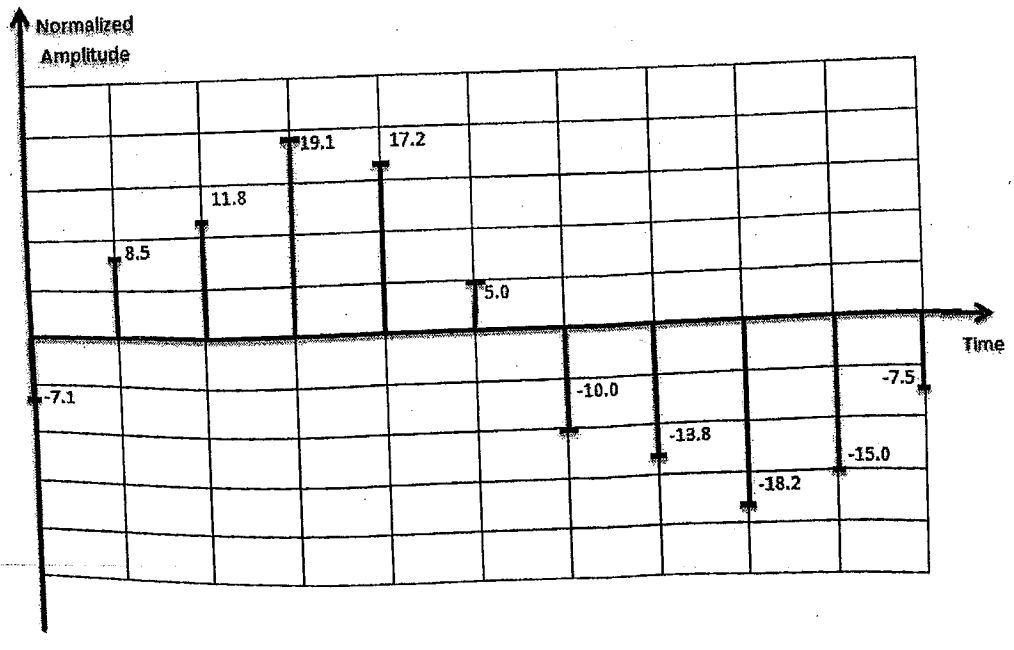
b. List down three processes of Pulse Code Modulation-PCM **(3 mark)**

c. What are the steps in Quantization? **(4 mark)**

d. Assume that we have a sampled signal and the amplitudes of the signal are between -20 to +20 V. We decided to have 8 levels. Following figure shows the actual amplitude of each sample. Find the following values for this sample.

i. Normalized values for each sample
ii. Normalized quantized value
iii. Normalized error
iv. Quantization code
v. Encoded codeword

(12 mark)



2.

a. What are the two approaches to packet switching? **(2 mark)**

b. Transmission of information in any network involves end-to-end addressing and sometimes local addressing (such as VCI). Following table shows the types of networks and the addressing mechanism used in each of them.

Network	Setup	Data Transfer	Teardown
Circuit-switched	End-to-end		End-to-end
Datagram		End-to-end	
Virtual-circuit	End-to-end	Local	End-to-end

Answer the following questions:

i. Why does a circuit-switched network need end-to-end addressing during setup and teardown phase? Why no addresses are needed during data transfer phase for this type of network?

ii. Why does a datagram network need only end-to-end addressing during the data transfer phase, but no addressing during the setup and teardown phases?

iii. Why does virtual-circuit network need addresses during all three phases? **(6 mark)**

c. Briefly explain the delay and efficiency in a Circuit-switched network, datagram network and virtual-circuit network by providing suitable diagrams. **(8 mark)**

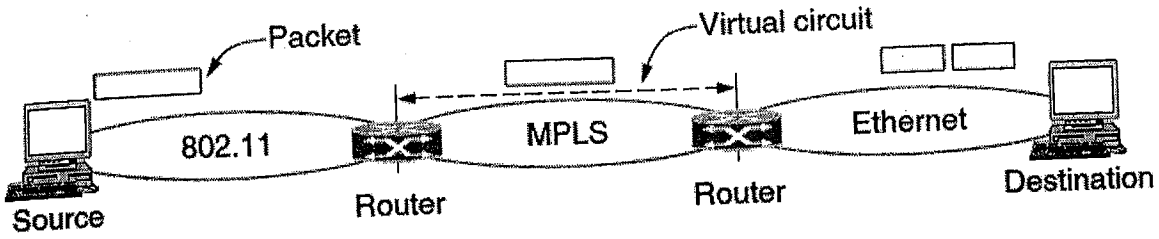
d. Design a three stage 200 x 200 switch (N=200) with k=4 and n=20, where N= number of input lines, n= number of groups, k= number of cross bars in middle stage. **(4mark)**

07

3.

a. List six properties that can be used to differentiate two networks. **(3 mark)**

b. Draw the protocol processing for the following journey given in the figure below (one message from source to destination) by considering TCP/IP layered architecture. **(4 mark)**



c. Briefly explain the "Tunneling" using appropriate diagrams. **(4 mark)**

d. When a large packet wants to travel through a network whose maximum packet size is too small, routers allow breaking up this packet into fragments. Assume that one original data packet contains 15 data bytes.

Draw the fragments of this packet after passing through a network with,

i. Maximum packet size of 16 payload bytes plus header.
ii. Maximum packet size of 8 payload bytes plus header.
iii. Maximum packet size of 5 payload bytes plus header.

Your assumptions should be clearly mentioned with the answers. **(6 mark)**

e. Draw the IP-V4 header and briefly describe all the fields. **(8 mark)**

07

4.

a. Traditionally the internet has been using a 16 bit checksum for error detection. What are the steps that the sender and receiver need to follow in-order to calculate the checksum? **(4 mark)**

b. Following diagram shows how the internet calculates the checksum for a text "Forouzan" using ASCII representations.

1	0	1	3	Carries
4	6	6	F	(Fo)
7	2	6	F	(ro)
7	5	7	A	(uz)
6	1	6	E	(an)
0	0	0	0	Checksum (initial)
8	F	C	6	Sum (partial)
		→	1	
8	F	C	7	Sum
7	0	3	8	Checksum (to send)

a. Checksum at the sender site

1	0	1	3	Carries
4	6	6	F	(Fo)
7	2	6	F	(ro)
7	5	7	A	(uz)
6	1	6	E	(an)
7	0	3	8	Checksum (received)
F	F	F	E	Sum (partial)
		→	1	
F	F	F	F	Sum
0	0	0	0	Checksum (new)

b. Checksum at the receiver site

A sender needs to send the text "communications" to the receiver.
Note: ASCII representations of the each letter in the text are, 0x63-c, 0x6F-o, 0x6D-m, 0x75-u, 0x6E-n, 0x69-i, 0x61-a, 0x74-t, 0x6E-n, and 0x73-s.

Answer the following questions.

i. Find the checksum at the sender site.
ii. Find the checksum at the receiver site if there is no error.
iii. Find the checksum at the receiver site if the 10th character is changed to "u". **(6 mark)**

c. Consider that you are given the dataword 1010011110 and the divisor 10111,
   i. Show the generation of the codeword at the sender site using binary division for CRC encoder.
   ii. Show the checking of the codeword at the receiver site assuming no error in the received codeword for CRC decoder.
   iii. Repeat "part i" and "part ii" using polynomials. **(15 mark)**