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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR

MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION

JANUARY 2010 SESSION

SUBJECT CODE	:	FCB 40502
SUBJECT TITLE	:	NETWORK AND MANAGEMENT SYSTEM
LEVEL	:	BACHELOR
TIME/DURATION	:	9.30 am – 12.00 noon 2 1/2 HOURS
DATE	:	30 April 2010

INSTRUCTIONS TO CANDIDATES

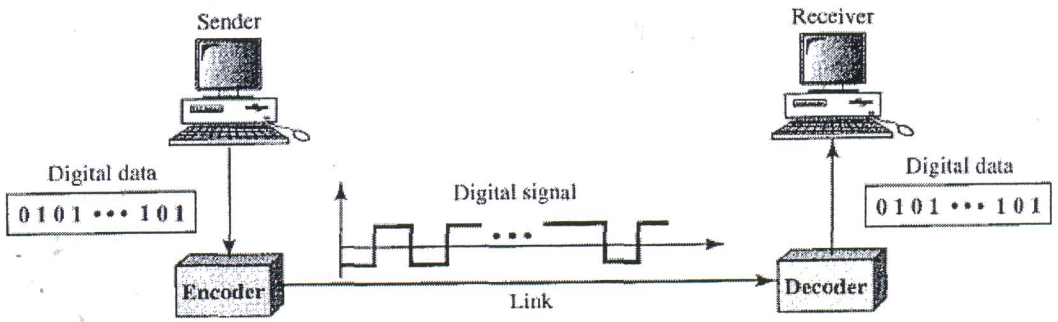
1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists only one section. Answer all questions.
6. Answer all questions in English.

THERE ARE 4 PRINTED PAGES OF QUESTIONS.

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1



The figure above shows the process of Line Coding and Decoding. At the sender, digital data are encoded into a digital signal; at the receiver, the digital data are recreated by encoding the digital signal.

a) Show how the following sequence of bits can be encoded using Unipolar - NRZ (Non-Return to Zero) encoding.

1 0 1 0 1 1 0 1 0 0 1 0 1 0

b) Show the same bit sequence encoded using Manchester encoding and Differential Manchester encoding..

c) What are the advantages and disadvantages of Manchester encoding, compared to NRZ encoding?

(9 marks)

Question 2

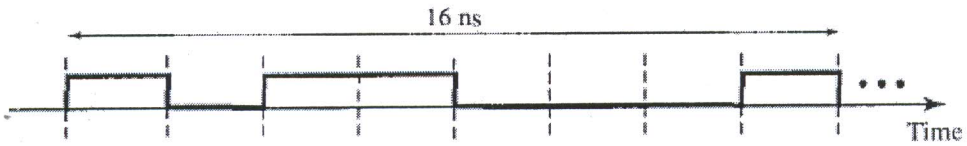


Figure 2.1

a) What is the bit rate for the signal in Figure 2.1?

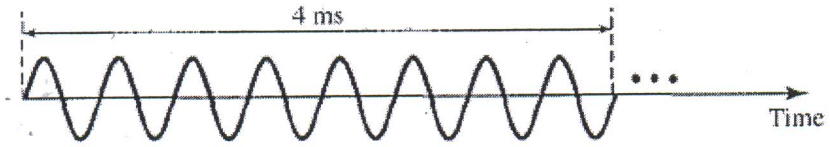


Figure 2.2

b) What is the frequency of the signal in Figure 2.2?

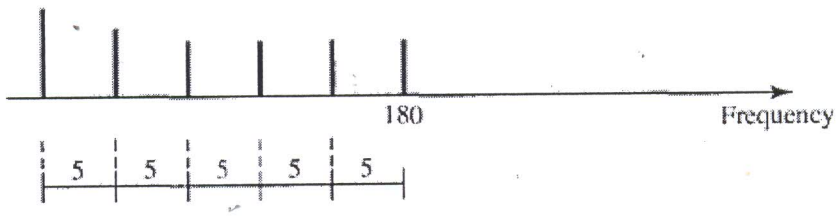


Figure 2.3

c) What is the bandwidth of the composite signal shown in Figure 2.3?

d) We have a channel with a 1-Mhz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level?

e) A network with bandwidth of 10Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 20,000 bits. What is the throughput of this network?

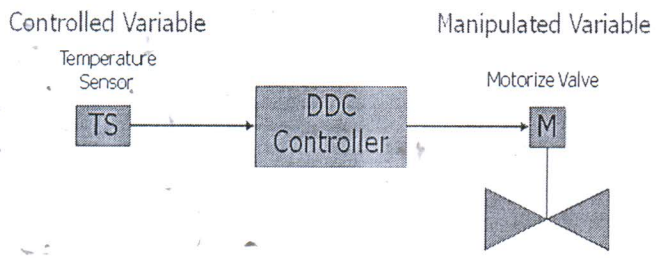
f) A signal travels from point A to point B. At point A, the signal power is 100W. At point B, the power is 90W. What is the attenuation in decibels?.

(12 marks)

Question 3

(a). Electromagnetic signals are used to carry data over a transmission medium. Describe, with the aid of diagrams, the difference between digital (discrete) and analog (continuous) signals.

(b).



Refer to diagram above, the building owner decided to use PID Controller for temperature control at 80 deg C. Explain what is PID control and how it could achieve the desired set-point.

(c). An analog input corresponding to a temperature range of -5°C to 140°C is converted to a digital data, in 16 bits. What are the resolutions of this variable, in degrees °C

(9 marks)

Question 4

A BEMS (Building Energy Management System) costs £20,000 and saves £8,000 worth of energy per year. It is recommended that new software for the central station is purchased every five years at a cost of £2,000. It is also recommended that the system is checked and maintained every two years at a cost of £1,000. A cynical manager considers that the BEMS will only last for ten years, and wants to know that the Net Present Value of the investment is, based on a discount factor of 10%.

a) What is the Net Present Value of the BEMS ?

b) What would the savings have to drop to stop the investment (When the NPV is zero)?

c) Further to question (b), what is the simple payback for this saving ?

d) State at least 4 advantage of implementing BEMS in the buildings besides of saving money for the building owner

(12 marks)

Question 5

a) Ethernet is designed to use a 'shared' medium, where numerous devices are attached to the same cable. Access to this medium is controlled by a MAC (Media Access Control) protocol. Ethernet uses a MAC protocol known as CSMA/CD (Carrier Sense Multiple Access / Collision Detection) – describe how this protocol works.

b)An Ethernet frame of 512 bits is transmitted by a synchronized transmission at a rate of 1.25×10^6 bytes/sec over a bus of maximum length 1200m. The speed of signal on the bus is 200,000 km/s

i) What is rate of this transmission in bits per second?

ii) What is the duration of transmission of the frame?

iii) What is the duration of propagation between TWO NIC (Network Interface card) at the end of the bus?

iv) How many bytes, at maximum, can be emitted by a NIC placed at one end before it can detect a collision with a frame emitted at the same instant by another NIC placed at the other end?

(12 marks)

Question 6

a) Assume six devices are arranged in a mesh topology.

- i) How many cables are needed?
- ii) How many ports are needed for each device?

b) For each of the following four networks, discuss the consequences if a connection fails.

- i) Five devices arranged in a mesh topology
- ii) Five devices arranged in a star topology (not counting the hub)
- iii) Five devices arranged in a bus topology
- iv) Five devices arranged in a ring topology

c) Draw a hybrid topology with a star backbone and three ring networks.

(18 marks)

Question 7

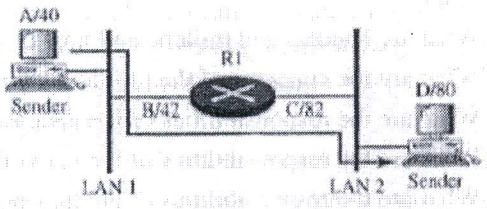
a) The OSI model is composed of seven ordered layers. Name them in sequence and briefly describe the function of each of the layers.

b) Some important data communication concept related to OSI layers are Protocol Data Units (PDU) and Data Encapsulation/Decapsulation. What is the names of PDU at each OSI layer and explain the concepts of Encapsulation and Decapsulation.

b) Draw the above protocol stacks side-by-side, showing where the protocols in the TCP/IP stack fit (as closely as possible) into the OSI Model.

c) In Figure below, computer A sends a message to computer D via LAN 1, router R1, and LAN2. Show the contents of the packets and frames at the network and data link layer for each hop interface.

d) In Figure below, assume that the communication is between a process running at computer A with port address ***i*** and a process running at computer D with port address ***j***. Show the contents of packets and frames at the network, data link, and transport layer for each hop.



(28marks)

END OF QUESTION

Formula:

1) Shannon Capacity, $C = B \log_2(1+SNR)$
2) Nyquist Bit Rate, Bit Rate = 2 x bandwidth x $\log_2 L$
3) Signal to noise ratio (dB), $SNR_{dB}=10\log_{10}SNR$
4) The cumulative discount factor is given by, say n years,

$$\left[\frac{1 - (1+r)^{-n}}{r}\right]$$