Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2014/2015

COURSE NAME	:	DATA COMMUNICATION NETWORK
COURSE CODE	:	BEB 40903
PROGRAMME	:	BACHELOR OF ELECTRONIC ENGINEERING WITH HONOURS
EXAMINATION DATE	:	JUNE / JULY 2015
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 (a) Briefly explain the function of each layer in the TCP/IP Procotol Suite.
(5 marks)

(b) An error occurs when a bit is altered between transmission and reception. Describe the process of error detection by referring to a suitable diagram.
(4 marks)

(c) Parity check is one of the methods for error detection. A string of 1000101 data is to be sent and a parity bit is attached to it.

(i) Assuming an odd parity, determine the string of total data sent to the receiver by using the proper technique.
(2 marks)

(ii) If an error of a single bit occured during the transmission, show how this error can be detected.
(2 marks)

(iii) If an error of double bits occureed during the trasmission, determine if this error can be detected.
(2 marks)

(d) A data transmission commences between two stations in a simple 4-node network. Assume that the transmitting station is located at the first node, and the receiving station is at the fourth node. The stations are 300 km apart; where the distance is equal between nodes. The transmitting station has a total 2,000,000 bits to be sent. All links are at a rate of 384 kbps and a speed of 2.6×10^8 m/s. Overheads are 24 bytes per transmission.

(i) Calculate the total transmission time, and the total propagation time if the data is sent all at once.
(4 marks)

(ii) Calculate the total transmission time, and the total propagation time if the data is fragmentized equally into four parts and sent one by one.
(4 marks)

(iii) Conclude your findings.
(2 marks)

Q2 (a) Explain briefly the following tasks of communication:

(i) Interfacing;
(ii) Recovery;
(iii) Message formatting; and
(iv) Network management.

(4 marks)

(b) Suppose that the spectrum of a communication channel is from 3 MHz to 4 MHz, and the signal to noise ratio is 24 dB.

(i) Calculate the channel capacity in the presence of noise.

(3 marks)

(ii) If there were no noise, determine the number of signal levels in order to achieve the channel capacity in Q2(b)(i).

(3 marks)

(c) Multistage switch can be used in Space Division Switching as shown in **Figure Q2(c)** below. Analyse if the following connections can be made:

(i) Input 2 to Output 4; and
(ii) Input 9 to output 6.

(4 marks)

(d) Using Bellman-Ford least cost algorithm, produce the routing table for node F to all other nodes for the network in **Figure Q2(d)** below.

(7 marks)

(e) A long string of bit 1 is being sent to a particular receiver. Suggest the most suitable encoding scheme in order to avoid synchronization problem.

(4 marks)

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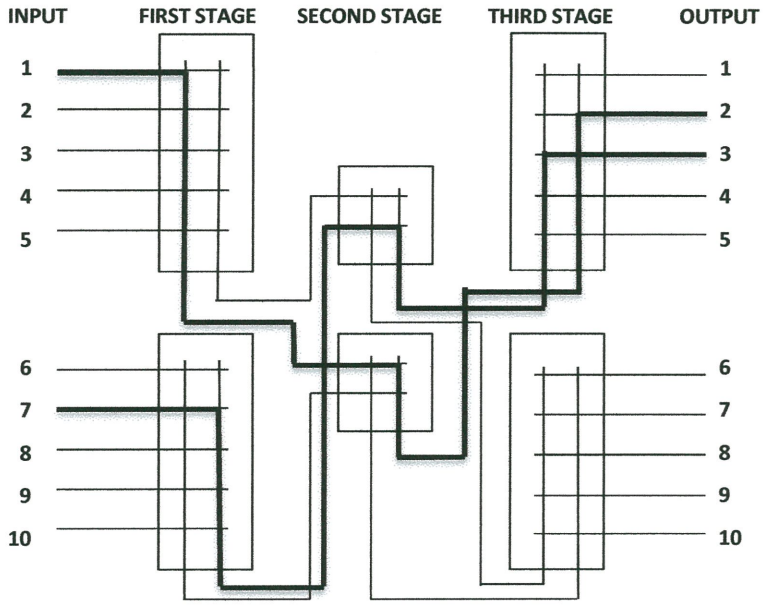

FIGURE Q2 (c)

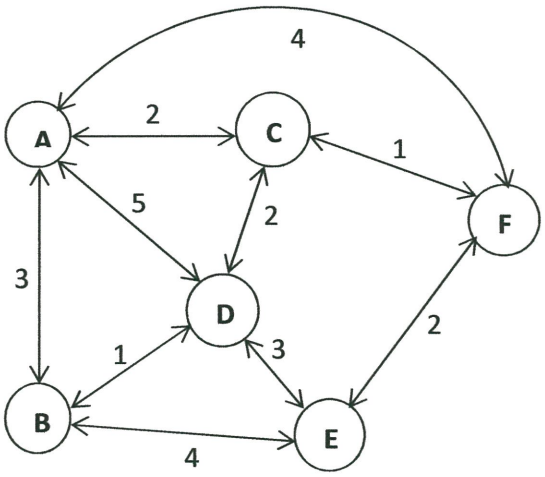

FIGURE Q2 (d)

Q3 (a) List the advantages of having connectionless operation at the IP level.
(3 marks)

(b) Differentiate the following types of Internet addressing:

(i) Unicast;
(ii) Anycast;
(iii) Multicast; and
(iv) Broadcast.

(6 marks)

(c) A string of data is to be sent over a communication channel and the Cyclic Redundancy Check (CRC) is used as the error detection mechanism. Illustrate how CRC is applied at the transmitter and receiver.
(6 marks)

(d) Transmission on Local Area Network (LAN) by using bus topology is said to be problematic if not properly regulated. Present a case where problems may occur on a bus topology and how LAN overcomes these problems.
(6 marks)

(e) You are asked to propose a newer version of Internet Protocol. Discuss the main issues that should be considered in your proposal.
(4 marks)

Q4 (a) Explain how Internet Protocol handles the following design issues:

(i) Routing;
(ii) Datagram lifetime; and
(iii) Fragmentation and reassembly.

(6 marks)

(b) Suggest your preferred asynchronous Medium Access Control (MAC) protocol of a LAN by discussing the advantages and disadvantages of available protocols.

(9 marks)

(c) With regards to IPv4 address:

(i) Provide the format for Class A, B, and C.

(3 marks)

(ii) Determine which class these addresses belong to:
1. 172.16.10.22; and
2. 10.10.10.5

(3 marks)

(d) You plan to transmit high-speed and delay-sensitive digital data over a distance of 100 km. Assess the suitability of using twisted pair as your transmission medium.

(4 marks)

Q5 (a) Explain briefly FOUR (4) features of circuit switching.

(4 marks)

(b) Connection between point A and B are to be made through a packet-switched network. It is expected to occur during peak time when nodes are busy handling packets. You are required to determine the most suitable routing strategy for this connection.

(6 marks)

(c) A mobile node is residing on its home network, Network A. The mobile node is now moving to a foreign network, Network B. Both networks support Mobile IP. Explain clearly how a datagram addressed to this mobile node is forwarded to the foreign network.

(6 marks)

(d) An organization is granted the block 16.0.0.0/8. The administrator wants to create 500 fixed-length subnets. Determine:

(i) the network and broadcast addresses in subnet 1;

(3 marks)

(ii) the first and last valid addresses in subnet 2; and

(3 marks)

(iii) the first and last valid addresses in subnet 300.

(3 marks)

- END OF QUESTION –