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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016**

**COURSENAME : DATA COMMUNICATION
NETWORKS**

COURSE CODE : BEB 40903

**PROGRAMME : BACHELOR OF ELECTRONIC
ENGINEERING WITH HONOURS**

EXAMINATION DATE : DECEMBER 2015 /JANUARY 2016

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS.

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

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- Q1** (a) Selective-Reject ARQ is more efficient compared to Go-Back-N ARQ protocol but much less widely used. Justify this statement. (4 marks)
- (b) Given a data link with a sliding window ARQ protocol with a window size of 7. Assume ACK N acknowledges frames through sequence number N-1. Host A sends four frames (D0, D1, D2 and D3). Draw and identify all the frames flow events that subsequently happen at both Host A and Host B (such as any control messages that are sent, frame that the host discards and any data frames that are resent in response to a control message), in response to the following error conditions.
- (i) If Go Back N ARQ protocol used and the second frame sent to Host B arrives damaged and undetected. (4 marks)
- (ii) If Go Back N ARQ protocol used and Host B returns an ACK of the fourth frame sent by Host A and the ACK is lost. (4 marks)
- (iii) If Selective-Reject ARQ protocol used and the second frame sent to Host B arrives damaged. (4 marks)
- (iv) If Selective-Reject ARQ protocol used and Host B returns an ACK of the fourth frame sent by Host A and the ACK is lost. (4 marks)

- Q2**
- (a) Give definition of circuit switching and packet switching. (2 marks)
 - (b) Describe advantages and disadvantages of circuit switching. (4 marks)
 - (c) Non-Blocking switched network is suitable for data transfer. Justify this statements (4 marks)
 - (d) In a single Space Division Switch (SDS) normally it is about 25% of crosspoints is utilized. In order to solve this problem multistage switch can be implemented. By having a single SDS to have 50 inputs and 50 outputs:
 - (i) Design a 3-staged Space Division Switch. The input and output lines must be divided into 5 groups. (6 marks)
 - (ii) Compare the total number of crosspoints between the 3-staged SDS and the single SDS (in percentage). (4 marks)
- Q3**
- (a) State the differences between switch and bridges. (3 marks)
 - (b) Consider 12 stations (hosts) attached to a 10 Mbps Ethernet. The throughput of the Ethernet is the total rate at which data is delivered to all the hosts. Assume all frames are addressed to individual stations, not to group or broadcast addresses. Calculate the maximum possible throughput for the following topology configuration:
 - (i) each host is connected to a single hub (repeater). (2 marks)
 - (ii) each host is connected via a half-duplex interface to a single Ethernet switch (bridge). (2 marks)
 - (iii) each host is connected via a full-duplex interface to a single Ethernet switch (bridge). (2 marks)
 - (c) Explain Hidden Terminal problem in Wireless LAN. (2 marks)
 - (d) Draw a diagram illustrating the Hidden Terminal Problem (you must explain how your diagram illustrates the problem.) (2 marks)

(e) The 802.11 Wireless LAN protocol suite uses CSMA/CA (Collision Avoidance) to help solve the hidden terminal problem instead of CSMA/CD.

(i) Explain why CSMA/CD designed for wired Ethernet LAN does not work for wireless LAN.

(2 marks)

(ii) Explain how CSMA/CA works can solves the hidden terminal problem. When explaining how CSMA/CA works you should assume a scenario in which there is a wireless network with (1) a sender, (2) a receiver and (3) other nodes. You should describe the actions taken by all of the members of the network when implementing the protocol.

(5 marks)

- Q4** (a) One of the unique features of TCP as a transport-layer protocol is its implementation of end-to-end congestion control. Although it was not part of the original TCP protocol design, congestion control was added in 1988 because of the inadequacies of network-layer congestion control in the Internet.
- (i) List two techniques found in virtually all modern implementation of TCP congestion control.
(2 marks)
 - (ii) Give a brief overview of the operation of each technique.
(8 marks)
- (b) Consider **Figure Q4(b)** modeling behavior experienced by a TCP protocol. The graph should be read to mean that Congwin=1 during round 1, Congwin=2 during round 2, Congwin =4 during round 3, etc..
- (i) Distinguish either this TCP RENO or TCP Tahoe.
(2 marks)
 - (ii) Determine in which round is slow-start operating.
(2 marks)
 - (iii) A loss event occurs during the 11th transmission round. Determine type of loss event occurs.
(2 marks)
 - (iv) A loss event occurs during the 17th transmission round. What type of loss event occurs?
(2 marks)
 - (v) Suppose there is no loss event during the 21st transmission round. Predict the value of Congwin be during the 22nd round.
(2 marks)

- Q5** (a) (i) Briefly describe the factors influencing the need to adopt IPv6 and replace IPv4. (3 marks)
- (ii) Explain enhanced provided by the IPv6 compared to IPv4. (3 marks)
- (b) An organisation is granted the block 125.238.0.0/16. The administrator wants to create 512 subnets:
- (i) Identify the subnet mask required. (2 marks)
- (ii) Calculate the number of addresses in each subnet. (2 marks)
- (iii) Determine the first and last allocatable addresses in subnet 1. (4 marks)
- (iv) Determine the first and last allocatable addresses in subnet 14. (6 marks)

- END OF QUESTIONS -

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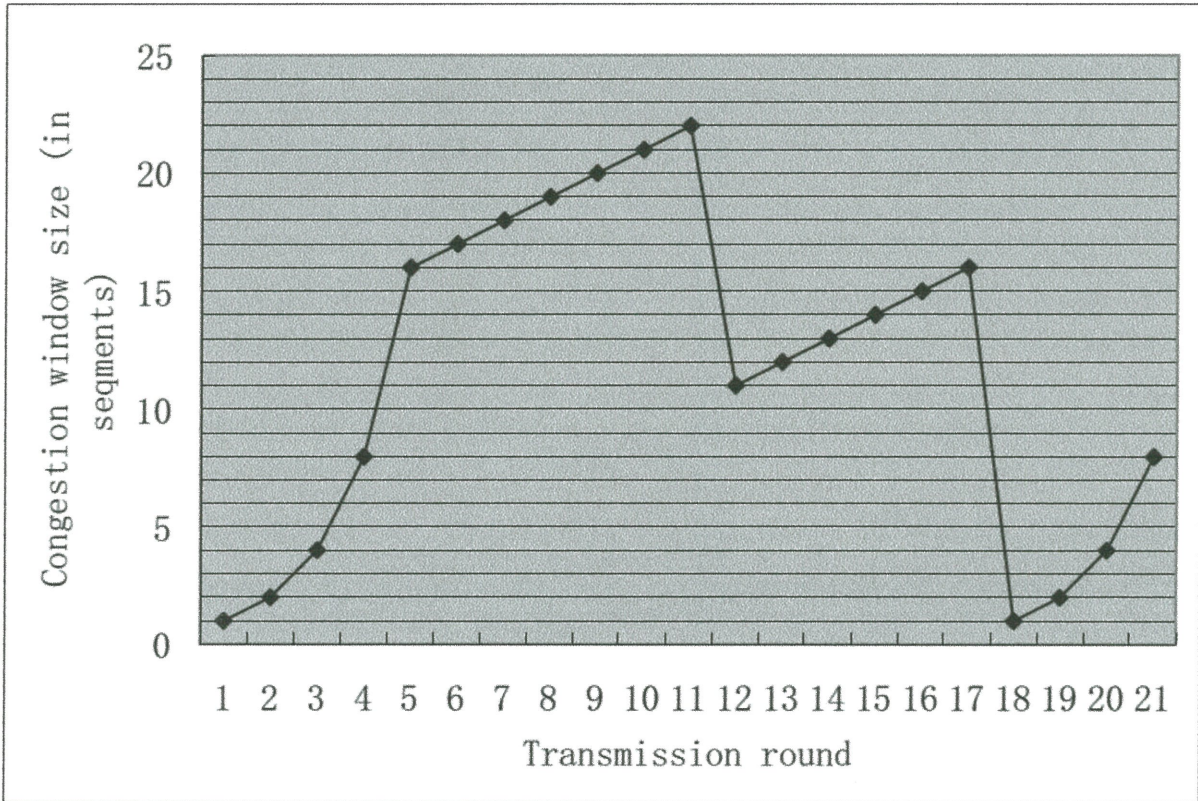


FIGURE Q4(b)