

EXAMINATIONS — 2012 TERMS TEST

NWEN 243

NETWORK APPLICATIONS

Time allowed: 40 minutes

Instructions: The examination contains 3 questions.

The exam consists of 40 marks in total.

Paper foreign to English language dictionaries are allowed.

Only silent non-programmable calculators or silent programmable calculators with their memories cleared are permitted in this examination.

Remember to show working.

Questions:

1) Physical and data link layer
2) Network layer
3) Transport layer

[6 marks] [18 marks] [16 marks] Spare page for answers.

Question 1 Physical and Datalink Layer

(a) [2 marks] Explain WHY the implementation of the datalink and physical layers for use with optical fibre would be simpler than the implementation of the same layers for use with copper wire.

Optical fibre: No electromagnetic interference therefore accurate delivery of signals and no errors. Copper wire: Electromagnetic interference leading to errors in delivery of signals.

(b) [2 Marks] OUTLINE the error detection process implemented at the datalink layer.

Before sending, an error detection code is computed over the contents of the frame.This is sent with the frame and extracted when it is received.The same error detection code is computed over the received frame and compared with the code originally sent.If these codes differ, the frame is assumed to have been corrupted during transmission.

(c) [2 Marks] Consider a switch. OUTLINE what will happen when a frame is received that does not have a corresponding entry in the switch table.

Record the address as associated with the interface on which the frame arrived and act like a hub and broadcast on all links except for that it arrived upon.

Spare page for answers.

Question 2 Network Layer

(a) [2 Marks] How MANY bytes are needed to represent: (i) an IPv4 address; (ii) an IPv6 address?

(i) 4 bytes; (ii) 16 bytes.

(b) [4 Marks] IDENTIFY the class of network (A, B or C) to which each of the following IPv4 addresses belong: (i) 192.100.10.5; (ii) 10.130.200.5.

EXPLAIN your reasoning.

(i) is class C and (ii) is class A. We know this because the MSB for (i) starts with 110 and the MSB for (ii) starts with 0.

- (c) You have been allocated the address space 129.254.128.0/26 for your organisation. You have been asked to divide this into FOUR equal subnets.
 - (i) [2 Marks] HOW MANY IP addresses will be in each subnet?

(ii) [2 Marks] For the FOURTH subnet STATE the network address.

(iii) [2 Marks] For the FOURTH subnet STATE the broadcast address.

(iv) [2 Marks] WHAT is the subnet mask?

(d) [4 Marks] Complete the routing table entries for the following network and number each host/adapter. Assume that you can number the hosts in your network from IP addresses chosen from the network 10.1.0.0/16.



Spare page for answers.

[16 marks]

Question 3 Transport Layer

(a) [6 Marks] OUTLINE the steps involved in a client sending a request and receiving a reply from a server using the TCP protocol.

Server creates a socket Socket has a well-known port number. Server waits for a connection. Client creates a socket. Client connects to server IP address and well-known port number. Sends a request on the socket. Waits for reply on socket. Server receives connection and allocates the client a connection socket. Server reads the request using the connection socket. Server sends a reply using the connection socket. Client reads reply. Client closes the socket.

- (b) Consider the Go-Back-N (cumulative) protocol. Assume that three segments (segments 0,1, and 2) have been sent and two acknowledgements (both acknowledging segment 0) have been received.
 - (i) [4 Marks] OUTLINE a scenario that could lead to the situation described above.

Segment 1 was lost and but segment 0 & 2 were received. Acknowledgement generated for segment 2 is 0 (because it is cumulative and reflects the last successful acknowledgement).

(ii) [2 Marks] WHAT are the next steps taken by the sender when no further acknowledgements are received before the timeout interval expires?

Timeout will cause segments 2 and 3 to be resent.

(c) Consider the Selective-Repeat protocol. Assume that three segments (segments 0,1, and 2) have been sent and two acknowledgements (acknowledging segments 1 and 2) have been received.

(i) [2 Marks] OUTLINE a scenario that could lead to the situation described above.

Either segment 0 has been lost or the acknowledgement for segment 0 has been lost.

(ii) [2 Marks] Assume the window size is three and that segments remain to be sent.

WHAT are the next steps taken by the when the missing acknowledgement for segment 0 is received prior to expiry of timeout interval?

Sender marks the segment 0 as being acknowledged. Advances the base of the window to segment four (number

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