

# ITS 413 – QUIZ 1 ANSWERS

First name: \_\_\_\_\_ Last name: \_\_\_\_\_

ID: \_\_\_\_\_

Total Marks: \_\_\_\_\_

out of 10

## Question 1 [2 marks]

- a) **Port numbers** are a type of address used to identify an *application* on a computer.
- b) **Congestion control** involves managing the rate at which hosts send, so that packets are not dropped (or buffered too long) at routers.

## Question 2 [2 marks]

One method of implementing IPTV (television over the Internet) is to have viewers (people) to select a channel, and the TV stream for that channel is sent only to those viewers. What addressing/delivery mechanism should be used for this method of IPTV? Explain your answer.

### Answer

Multicast. Each viewer can subscribe to the multicast group and then the TV stream is sent using multicast routing/delivery to the users. Multicast saves on bandwidth as only one copy of the stream is sent over paths that lead to multiple destinations.

## Question 3 [2 marks]

You develop a new application layer protocol that implements a very simple “SMS” application. It takes data from the user (e.g. a short message up to 160 bytes in length), adds a 20 byte header for addressing and control purposes, and sends the resulting message to the receiver. No other control messages are used. Your protocol uses TCP, which in your current network provides 100% reliability and a transfer rate of 900kb/s.

- a) What is the maximum throughput of your new protocol in the network?

### Answer

160 bytes data + 20 bytes of overhead, therefore efficiency of  $160/180 = 8/9$ . Throughput is 800kb/s.

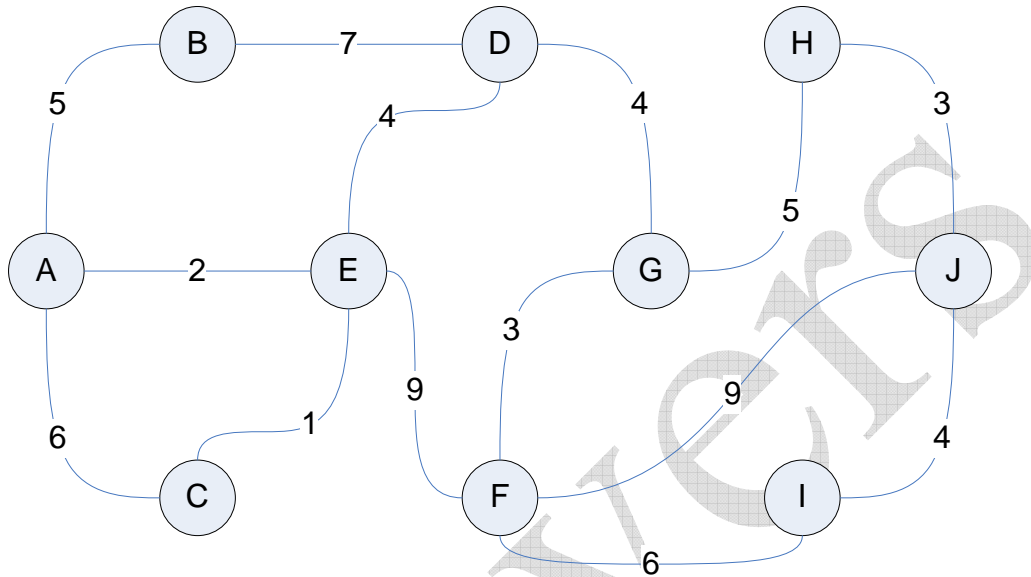
- b) If you added Stop-and-wait error control to your new application protocol, where each acknowledgement message was 20 bytes in length, what is the maximum throughput (ignore any propagation and processing delays)?

**Answer**

160 bytes of data + 40 bytes of overhead, therefore throughput is 720kb/s.

**Question 4** [4 marks]

Consider the network below. For each link a cost is shown. Assume the links are bi-directional, and the costs are identical in both directions. Node A wants to send a packet to node J.



- a) What is the total cost of transmission if flooding is used? Assume the TTL is initially 3, and a node will only forward the same packet one time.

**Answer**

A to B, C, E: 13

C to D: 7

C to E: 1

E to D, C, F: 14

D to G: 4

F to G, J, I: 18

Total cost: 57

- b) Explain an advantage and disadvantage of using a shorter TTL of 2.

**Answer**

Advantage: lower transmission cost (35)

Disadvantage: message will not reach destination!

- c) If instead of flooding, a least-cost routing algorithm was used in the above network, what would be the cost of forwarding the packet?

**Answer**

Least cost path is A-E-D-G-H-J, with cost 18.

- d) In comparison to flooding, what *other* transmission cost must be incurred in least-cost routing in addition to that in part (c)?

**Answer**

Routing table distribution. For least cost routing, the routers need to know about the least-cost paths, and hence need to transfer information to each (usually on a regular basis to keep up to date). This incurs a transmission cost. Flooding doesn't need routing table distribution.

ANSWERS