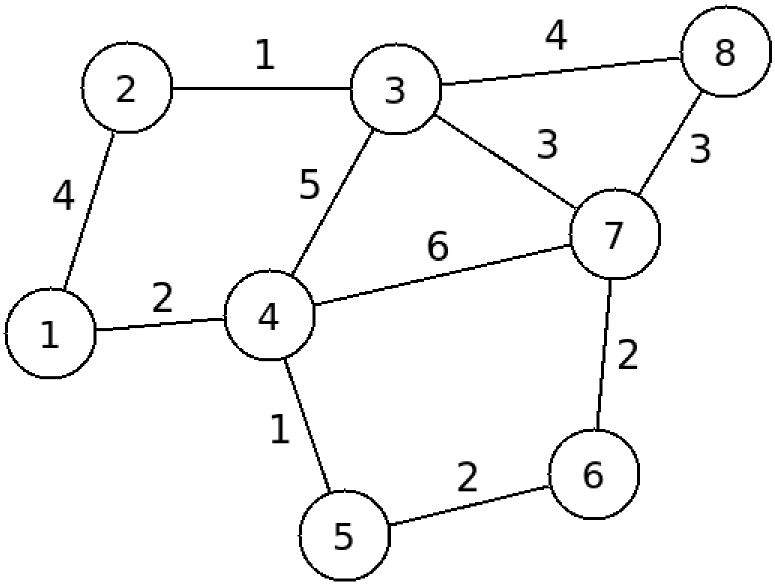
ITS323 – Quiz 6 Answers

Name: ____

ID: ______________________________ Mark: __________ (out of 7)

Question 1 [4 marks]

The following diagram shows a network of nodes with the costs shown for each link (the costs are the same in both directions of the link). Assuming least-cost routing, complete the routing table for node 1/8/6.



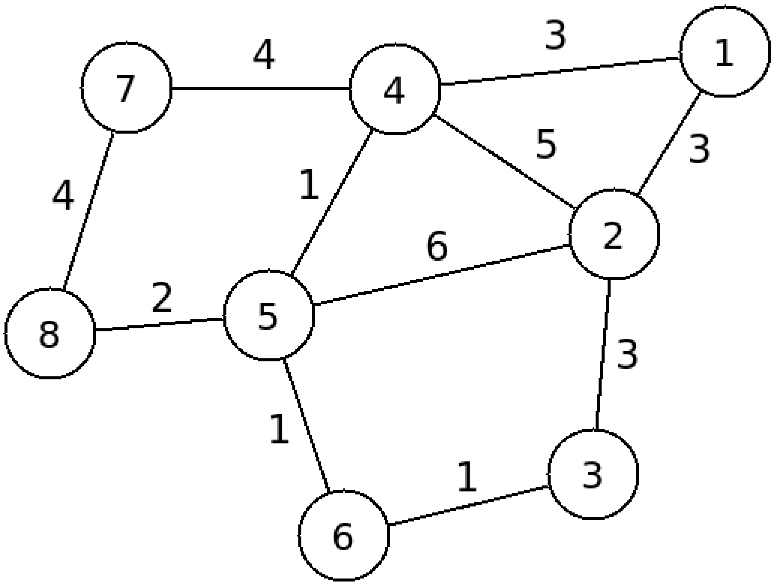
Node		
Destination	**Next Node**	**Cost**

Answers

Node 1			
Destination	**Path**	**Cost**	**Next Node**
2	1-2	4	2
3	1-2-3	5	2
4	1-4	2	4
5	1-4-5	3	4
6	1-4-5-6	5	4
7	1-4-5-6-7	7	4
8	1-2-3-8	9	2

Node 8			
Destination	**Path**	**Cost**	**Next Node**
1	8-3-2-1	9	3
2	8-3-2	5	3
3	8-3	4	3
4	8-7-6-5-4	8	7
5	8-7-6-5	7	7
6	8-7-6	5	7
7	8-7	3	7

Node 6			
Destination	**Path**	**Cost**	**Next Node**
1	6-5-4-1	5	5
2	6-7-3-1	6	7
3	6-7-3	5	7
4	6-5-4	3	5
5	6-5	2	5
7	6-7	2	7
8	6-7-8	5	7



Node 1			
Destination	**Path**	**Cost**	**Next Node**
2	1-2	3	2
3	1-2-3	6	2
4	1-4	3	4
5	1-4-5	4	4
6	1-4-5-6	5	4
7	1-4-7	7	4
8	1-4-5-8	6	4

Node 8			
Destination	**Path**	**Cost**	**Next Node**
1	8-5-4-1	6	5
2	8-5-6-3-2	7	5
3	8-5-6-3	4	5
4	8-5-4	3	5
5	8-5	2	5
6	8-5-6	3	5
7	8-7	4	7

Node 6			
Destination	**Path**	**Cost**	**Next Node**
1	6-5-4-1	5	5
2	6-3-2	4	3
3	6-3	1	3
4	6-5-4	2	5
5	6-5	1	5
7	6-5-4-7	6	5
8	6-5-8	3	5

Question 2 [1 mark]

a) What is an advantage of using a hop count in flooding protocols?
b) What is a disadvantage of using a hop count in flooding protocols?
c) What is an advantage of using a sequence number in flooding protocols?
d) What is a disadvantage of using a sequence number in flooding protocols?

Answers
Hop count advantage: limit the number of packets sent in the network, thereby potentially reducing network overhead.
Hop count disadvantage: extra field in packet header contributes overhead; packet may not reach destination.
Sequence number advantage: allows nodes to determine if a duplicate packet has been received (and hence does not need to re-send, reducing network overhead).
Sequence number disadvantage: extra field in packet header contributes overhead.

Question 3 [2 marks]

a) One aim of Medium Access Control (MAC) in LANs is to ensure frames (or transmissions) do not collide with each other. **T** / F

b) One aim of Medium Access Control (MAC) in LANs is to ensure only one user (computer) transmits at a time. **T** / F

c) Distributed control for Medium Access Control protocols has the advantage of avoiding performance bottlenecks at a central node. **T** / F

d) Centralised control for Medium Access Control (MAC) has the advantage (compared to distributed control) that if the controlling station fails, the network can still operate. T / **F**

e) The IEEE 802 series of LAN standards focus on the Physical Layer, Data Link Layer and Network Layer of the OSI model. T / **F**

f) The IEEE 802 series of LAN standards focus on the Physical Layer and Data Link Layer of the OSI model. **T** / F

g) A contention-based MAC protocol allows stations to reserve time slots for transmissions in the future. T / **F**

h) A contention-based MAC protocol gives each station a turn at transmitting in an ordered manner (e.g. station 1, station 2, station 3, …). T / **F**

Question 1 [2 marks]

In an internet, three types of fragmentation (and re-assembly) are possible

Type 1: Fragment at source, re-assemble at destination

Type 2: Fragment at source and routers, re-assemble at destination

Type 3: Fragment at source and routers, re-assemble at routers and destination

Consider the path as shown below, where the maximum frame size (in Bytes) for each link is shown.

A ←— 1500 —→ B ←— 1000 —→ C ←— 500 —→ D ←— 2000 —→ E

If Type 1/2/3 fragmentation and re-assembly is used, list the fragments that would be sent over the 2^{nd} link (from B to C) if source A had 4000 Bytes of data to send to destination E. For each fragment, indicate its size.

Answer

Type 1: 8 x 500 B fragments

Type 2: 3 x 1000 + 2 x 500 B fragments

Type 3: 4 x 1000 B fragments

Question 2 [2 marks]

The two special cases addresses (directed broadcast and network) are not allowed to assigned to interfaces of hosts or routers. Assume a router on a LAN has IP address 96.107.19.4/160.203.156.23/208.92.68.12. What is the maximum number of IP hosts that can be attached to the same LAN as the router? Explain your answer.

Answer

96.107.19.4 is a Class A address. Therefore there are 24 bits in the host portion, giving 2^{24} possible addresses. Subtract the two special cases and the router, there can be 2^{24}-3 hosts.

160.203.156.23 is a Class B address. There are 16 bits in the host portion, meaning 2^{16}-3 hosts.

208.92.68.12 is a Class C address. There are 8 bits in the host portion, meaning 2^{8}-3 hosts.

Question 3 [1 mark]

Explain the main difference between a host and a router?

Answer

A router will forward packets, a host will not.

Question 1 [1 mark]

Which of the following services/features are part of IP (circle one answer):

Error control Ordered Delivery Connection-less Security

Connection-oriented Addressing Flow control Circuit switching

Quality of service Error control Datagram packet switching Connection setup

Answer

Connection-less

Addressing

Datagram packet switching

Question 2 [2 marks]

Assume IP Fragmentation and Re-assembly is used for sending 3000/4000/4000 Bytes of data from A to D. The diagram below shows the maximum datagram size for each link in bytes.

A ---- 1000 ---- B ---- 500 ---- C ----2000 ---- D

A ---- 3000 ---- B ---- 2000 ---- C ----1000 ---- D

A ---- 3000 ---- B ---- 2000 ---- C ----1500 ---- D

For the link from C to D/B to C/B to C, list the fragments sent over the link, including the size of each fragment.

Answer

A ---- 1000 ---- B ---- 500 ---- C ----2000 ---- D

3 x 1000 6 x 500 **6 x 500**

A ---- 3000 ---- B ---- 2000 ---- C ----1000 ---- D

1 x 3000 + 1 x 1000 **1 x 2000 + 2 x 1000** 4 x 1000

A ---- 3000 ---- B ---- 1500 ---- C ----1500 ---- D

1 x 3000 + 1 x 1000 **1 x 2000 + 2 x 1000** 2 x 1000 + 1x 1500 + 1x500

Question 3 [2 marks]

Assume classful addressing is used.

a) Host 161.205.111.38/97.161.222.74/209.108.113.54 is on a LAN. What is the network address for the LAN?

b) What class of IP address what be ideal for a network with 100/1000/10000 hosts?

Answer

161.205.0.0	97.0.0.0	209.108.113.0
Class C	Class B	Class B