北京郵電大學

Queen Mary University of London

For examiners' use only

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EBU5403 A

Joint Programme Examinations 2017/18

EBU5403 Internet Protocols

Paper A

Time allowed 2 hours

Answer ALL questions

Complete the information below about yourself very carefully.

QM student number										
BUPT student number										
Class number										

INSTRUCTIONS

1. **You must NOT take answer books, used or unused, from the examination room.**
2. Write only with a black or blue pen **and in English**.
3. Do all rough work in the answer book – **do not tear out any pages**.
4. If you use Supplementary Answer Books, tie them to the end of this book.
5. Write clearly and legibly.
6. **Read the instructions on the inside cover.**

Examiners

Dr Michael Chai, Dr Richard Clegg

Filename: 1718_EBU5403_A No answer book required

Instructions

Before the start of the examination

1) Place your BUPT and QM student cards on the corner of your desk so that your picture is visible.

2) Put all bags, coats and other belongings at the back/front of the room. All small items in your pockets, including wallets, mobile phones and other electronic devices must be **placed in your bag in advance**. **Possession of mobile phones, electronic devices and unauthorised materials is an offence.**

3) Please ensure your mobile phone is switched off and that no alarm will sound during the exam. **A mobile phone causing a disruption is also an assessment offence.**

4) Do not turn over your question paper or begin writing until told to do.

During the examination

1) You must not communicate with or copy from another student.

2) If you require any assistance or wish to leave the examination room for any reason, please raise your hand to attract the attention of the invigilator.

3) If you finish the examination early you may leave, but not in the first 30 minutes or the last 10 minutes.

4) For 2 hour examinations you may **not** leave temporarily.

5) For examinations longer than 2 hours you **may** leave temporarily but not in the first 2 hours or the last 30 minutes.

At the end of the examination

1) You must stop writing immediately – **if you continue writing after being told to stop, that is an assessment offence.**

2) Remain in your seat until you are told you may leave.

Question 1

a) Draw all the layers of the OSI network stack and the TCP/IP reference model showing how they are related.

[5 marks]

	Do not write in this column
	5 marks

b) Give the name (not just number) of the layers of the network stack described below:

i. This layer exists at end hosts and takes care of reliability (if any) by ensuring lost data is retransmitted and all data arrives reliably in order.

ii. This layer would be used by programmers to open and close sockets and to send data from one machine to another.

iii. This layer contains the routing protocols OSPF and RIP.

iv. This layer would move data from somewhere in a subnetwork to another place in the same subnetwork.

v. This layer would move data across the network from the initial source machine to the final destination machine.

[5 marks]

	Do not write in this column
	5 marks

c) UDP features:

[12 marks]

i. How do the source and destination port allow multiplexing and demultiplexing of traffic? (5 marks)

ii. How do the sender and receiver use the checksum field in the UDP header (you do not need to include details of the calculation itself)? (5 marks)

iii. Traffic is sent from 144.32.124.4:1243 to 144.32.145.5:90 (the numbers after the : are port numbers. If 144.32.145.5 wants to reply, what will it use as the destination IP and port? (2 marks)

	Do not write in this column

12 mars

d) Draw a diagram to show how data is encapsulated in the various TCP layers as data moves from the application layer to the data link layer showing headers at layers 4,3 and 2.

[3 marks]

	Do not write in this column
	3 marks

Question marking: $\frac{}{5} + \frac{}{5} + \frac{}{12} + \frac{}{3} = \frac{}{25}$

Question 2

a) Describe the role of congestion control and flow control paying attention to which window is used for which mechanism and any header fields you think are relevant. (You do not need to describe mechanisms for congestion control).

[5 marks]

	Do not write in this column
	5 marks

b) What is meant by AIMD (additive increase multiplicative decrease) in the TCP congestion window?

[6 marks]

	Do not write in this column
	6 marks

c) Are the following IP addresses valid? If not, why not?

[3 marks]

i. 127.0.0.1
ii. 132.2.256.2
iii. 133.23.1.2.1

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	3 marks

d) You are given the network diagram from Figure 1.

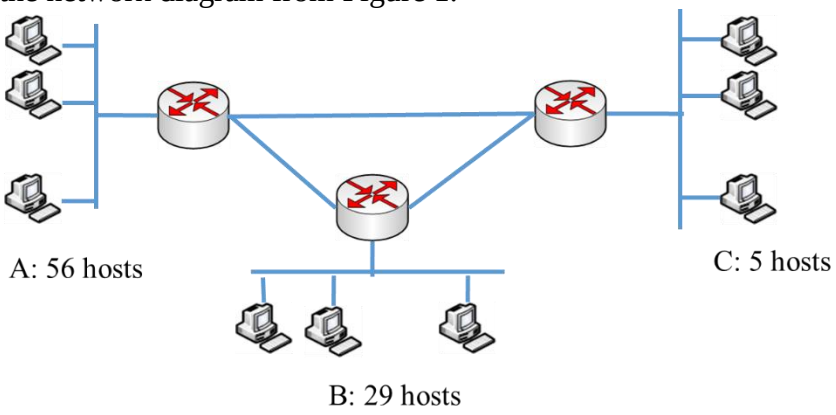

Figure 1

You have the network 144.132.26.0/24. Efficiently assign addresses to the subnets A, B, C in that order as early as you can in the address space (assuming the networks will not get any more hosts).

[11 marks]

i. For A, B and C give the network addresses in / notation.

(6 marks)

ii. For A, B and C give the broadcast addresses.

(3 marks)

iii. Look at the links between the three routers. How many subnets are there between the pairs of routers and what /n should they be given if we want to give them the smallest number of host addresses they need to function?

(2 marks)

	Do not write in this column

		11 marks

Question marking: $\frac{}{5} + \frac{}{6} + \frac{}{3} + \frac{}{11} = \frac{}{25}$

Question 3

a) With reference to the topology shown in Figure 2, use Dijkstra's algorithm to generate the Shortest Path Tree originating from router U and use it to construct the corresponding routing table. It is important to clearly show how you arrived at your answer.

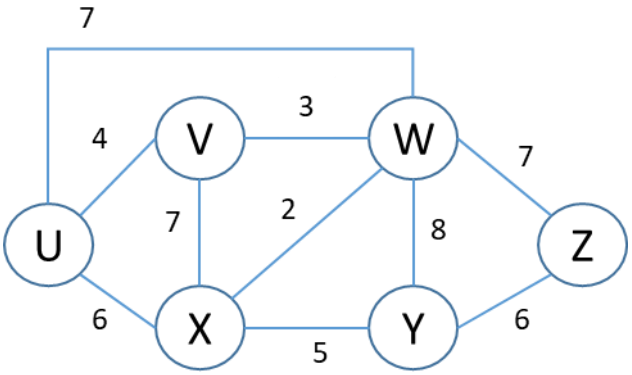

Figure 2

[9 marks]

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		9 marks

b) Explain how do source host, destination host and routers respond to traceroute command.

[5 marks]

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	5 marks

c) Answer the following questions related to addressing and Address Resolution Protocol (ARP).

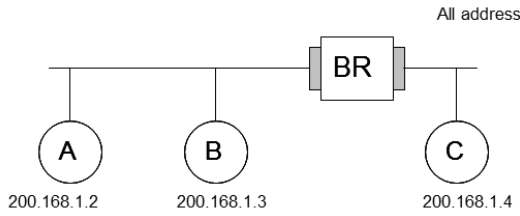

Figure 3a

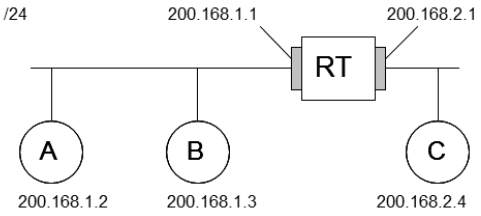

Figure 3b

[11 marks]

i) Describe how host 200.168.1.2 is able to deliver Internet Protocol datagrams to host 200.168.1.4 on the same Ethernet network, via bridge BR, illustrating your answer with reference to Figure 3a. Your answer should include a full description of the role played by the ARP and assume that no previous communication has taken place for some time.

(6 marks)

ii) The bridge is now replaced with a router RT, as shown in Figure 3b. Explain any differences that would arise in the process of how host 200.168.1.2 delivers data to host 200.168.2.4. Once again, assume that no previous communication has taken place for some time.

(5 marks)

	Do not write in this column

	11 marks

Question marking: $\frac{}{9} + \frac{}{5} + \frac{}{11} = \frac{}{25}$

Question 4

a) An IEEE 802.3 CSMA/CD network is designed with a maximum one-way propagation delay of 1ms and a bit-rate of 100Mbps. Calculate the size of this minimum frame.

[6 marks]

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	6 marks

b) If the span of the network in Question 4a remains the same, such that the one-way propagation delay is still 1ms, calculate the minimum frame size if the transmission speed was increased to 10Gbps. What are the implications of this frame size?

[4 marks]

	Do not write in this column
	4 marks

c) With the aid of a diagram, explain how Frame bursting can be used to improve the condition in Question 4b.

[5 marks]

	Do not write in this column
	5 marks

d) In Carrier Sense Multiple Access/Collision Avoidance, give the full names and briefly explain the roles of ACK, RTS and CTS.

[9 marks]

	Do not write in this column

		9 marks

e) Put ACK, RTS, CTS and Data transmission into the correct order so that they could be sent in a successful CSMA/CA transmission.

[1 mark]

	Do not write in this column
	1 mark

Question marking: $\frac{}{6} + \frac{}{4} + \frac{}{5} + \frac{}{9} + \frac{}{1} = \frac{}{25}$

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