北京郵電大學

Queen Mary University of London

Complete the information below about yourself very carefully.

QM student number	
BUPT student number	
Class number	

Complete the information below about the exam you are taking very carefully.

Module code number	
Module title	
Make and type of any electronic calculator you are using	

Write down the question number of the questions you have answered in the order you answered them.

Question No.					
Marks ***(For examiners' use only)***					**Total:**

INSTRUCTIONS TO CANDIDATES

1. **You must not take answer books, used or unused, from the examination room.**
2. Write on both sides of the paper.
3. Write only in black or blue pen **and in English**.
4. **Begin each answer on a separate page.**
5. **Carefully complete the information for each section**
6. Do all rough work in the answer book – **do not tear out any pages**.
7. If you use Supplementary Answer Books, tie them to the end of this book. Do not write answers in an additional answer book until you have used all of the pages in this book
8. **Read the instructions on the inside cover.**

Write clearly and legibly.

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 **[25 marks]**

a) In the context of IEEE 802.11 networks, answer the following questions.

i) Explain the principle operation of CSMA/CA access method.

[6 marks]

	Do not write in this column
	6 marks

ii) Explain how frame bursting in IEEE802.11 medium access control (MAC) layer can reduce the probability of damaged frame.

[8 marks]

	Do not write in this column

	8 marks

iii) Explain why CSMA/CA access method cannot fully prevent exposed station problem.

[4 marks]

	Do not write in this column

	4 marks

iv) Why is the collision avoidance method more feasible than the collision detection method in wireless medium?

[2 marks]

	Do not write in this column
	2 marks

b) Explain what is "fragmentation" and its purpose. With reference to the appropriate fields in the IPv4 header, describe how it operates.

[5 marks]

	Do not write in this column

	5 marks

Question 2 **[25 marks]**

a) Explain the format of IPv4 classful addressing and why different classes exist. Also explain what is special about the address ranges 10.0.0.0– 10.255.255.255 and 192.168.0.0 – 192.168.255.255.

[7 marks]

	Do not write in this column
	7 marks

b) What is subnetting and why is it important? Assuming a company has a classful IP address 178.43.5.0, describe how 6 departments can be accommodated using subnetting, clearly showing the value of the subnet mask (it is assumed the same subnet mask is applied throughout the organisation). Indicate how many hosts can be supported in each subnet and also explain why the "all 0s" subnet is usually not used.

[7 marks]

	Do not write in this column
	7 marks

c) Describe the operation of the Open Shortest Path First (OSPF) routing protocol drawing particular attention to how it improves upon Distance-Vector routing schemes.

[6 marks]

	Do not write in this column
	6 marks

d) How does least-cost hop-by-hop and source routing differ? Describe the problem relating to least-cost hop-by-hop routing that source-routing can avoid. Explain why source-routing isn't used more generally.

[5 marks]

	Do not write in this column
	5 marks

Question 3 **[25 marks]**

a) Compare the two transport-layer protocols User Datagram Protocol (UDP) and Transmission Control Protocol (TCP) in terms of their features and performance.

[8 marks]

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	8 marks

b) Describe the operation of a Continuous Request Automatic Repeat Request (ARQ) with a Go-Back-N strategy and why the sequence number modulus (SN) must be strictly greater than the transmission window size. Illustrate your answer with a diagram where SN range is 0..3.

[6 marks]

	Do not write in this column
	6 marks

c) Flow Control

i) Brief define the term Flow Control.

[3 marks]

	Do not write in this column
3 marks	

ii) Describe the operation of the Stop & Go and Sliding Window flow control mechanisms using diagrams where appropriate. Identify which of the two flow control mechanisms is superior and explain why.

[8 marks]

	Do not write in this column

	8 marks

Question 4 **[25 marks]**

a) With regard to Transmission Control Protocol (TCP):

i) Explain how TCP is able to operate satisfactorily over communication networks with a wide variety of the round-trip times. How is the variance of the round-trip times taken into account?

[4 marks]

	Do not write in this column
	4 marks

ii) Explain what is meant by Silly Window Syndrome and how it can be avoided.

[5 marks]

	Do not write in this column

	5 marks

iii) Explain the purpose of the following TCP segment header fields:

- Source / Destination Port Numbers
- SYN Flag
- Data Offset
- Acknowledgement Number

[4 marks]

	Do not write in this column

	4 marks

b) What can be deduced from the reception of duplicate acknowledgements in TCP? With TCP Reno how is this information used in to maintain channel utilisation and why is a duplicate acknowledgement threshold set?

[5 marks]

	Do not write in this column
	5 marks

c) With reference to the IP version 4 header, shown in Figure 1, indicate which fields have been changed or removed in the IP version 6 (IPv6) header.

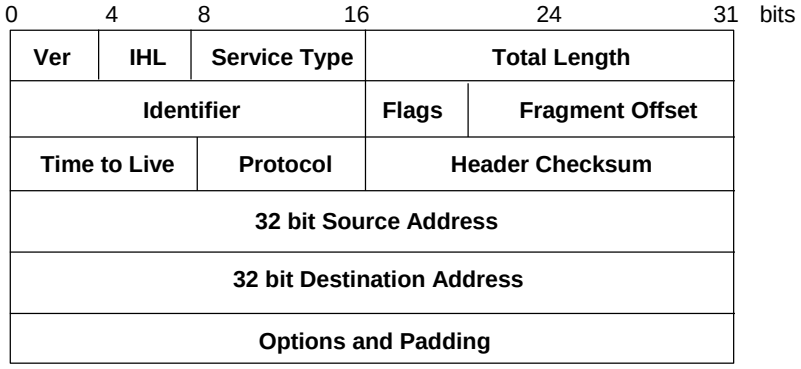

Figure 1:- IP Version 4 Header

In each case explain how the function associated with the given IPv4 header field is now achieved with IPv6.

[7 marks]

	Do not write in this column

	7 marks

End of the paper