THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

UNIVERSITY OF LONDON **CO2222 ZB**

BSc Examination

COMPUTING AND INFORMATION SYSTEMS

Data Communications and Enterprise Networking

Thursday 4 May 2018: 14.30 – 17.30

Time allowed: 3 hours

This paper is in two parts: Part A and Part B. There are a total of **THREE** questions in each part. You should answer **TWO** questions from Part A and **TWO** questions from Part B.

Full marks will be awarded for complete answers to a total of **FOUR** questions, **TWO** from Part A and **TWO** from Part B. The marks for each part of a question are indicated at the end of the part in [.] brackets.

Only your first **TWO** answers from Part A and first **TWO** answers from Part B, in the order they appear in your answer book, will be marked.

There are 100 marks available on this paper.

No calculators should be used.

Part A

Answer TWO questions from Part A

Question 1

a) State which two of the following statements are true and which two are false and, for false statements, write out a corrected true statement:

i. A beacon can signal multiple bits of information.
ii. Jitter is related to signal delays.
iii. Circuit switching works on the basis of time allocations.
iv. Distribution networks provide absolute resilience.

[4]

b) What is a ring topology? Why would a network engineer implement one and in what type of networks? What would be its advantages and disadvantages? Please use a diagram to illustrate your answer.

[7]

c) Why is the standard method of defining subnets inefficient and how can this issue be overcome?

[4]

d) How would TCP and UDP compare in terms of the different type of applications employed over them (*e.g.* data, multimedia-rich, *etc.*)?

[5]

e) What does Nyquist's theorem consider and what is its mathematical formula in the case of the general theorem? What is the maximum theoretical capacity of a 5.2kHz channel in which a signal is carried using 32 signalling levels?

[5]

Question 2

a) State which two of the following statements are true and which two are false and, for false statements, write out a corrected true statement:

i. Packets sent in virtual circuits contain a full network address.
ii. E-mail can be used with message switching.
iii. Datagram is a type of packet switching.
iv. Bus topology is common in Metropolitan Area Networks.

[4]

b) What is the need for segmentation and how does it work with network layer protocols?

[6]

c) What is the problem of transparency with data link protocols and how can it be overcome?

[7]

d) What is a Media Access Control (MAC) address and what is its format?

[4]

e) State and define **TWO** ways we can use to achieve flow control.

[4]

Question 3

a) State which two of the following statements are true and which two are false and, for false statements, write out a corrected true statement:

i. Star networks are very resilient to failures.
ii. Tree networks are resilient to failures.
iii. Peer layers can communicate.
iv. Classification of network devices is done by the highest layer that these devices can operate on.

[4]

b) How do the Go Back N and Selective Repeat methods work on the data link layer, and how do they compare?

[6]

c) How do Point-to-Multipoint and Broadcast Transmission methods work?

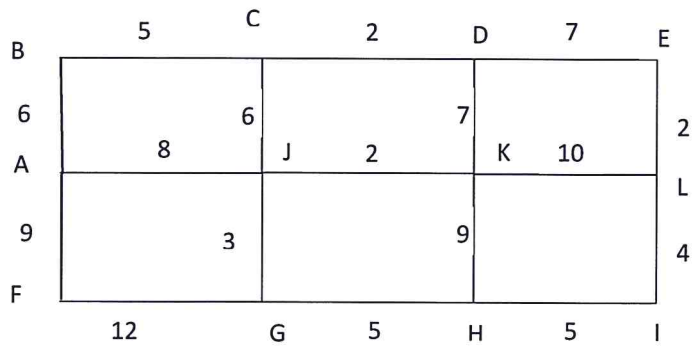
[4]

d) How does the Reservation Access Method work in controlled access and what are its advantages?

[5]

e) Draw the network diagram below and use Dijkstra's algorithm to calculate the shortest route between A and L, where the numbers represent distances between the nodes. On your diagram, show the node labels you have used at each step of the algorithm and mark the shortest path with a thick line.

[6]



Part B

Answer TWO questions from Part B

Question 4

a) State which two of the following statements are true and which two are false and, for false statements, write out a corrected true statement:

i. Low cost automatically implies low price.

ii. Psychographic is not a method for segmenting customer markets.

iii. Telecommunication incumbents will usually follow the strategy of differentiation.

iv. Churn is the movement of customers from one operator to another as there is not much difference between their offerings.

[4]

b) What is the cost leadership strategy in order to achieve competitive advantage and what are its shortcomings?

[6]

c) How are a star and a dog identified in market growth?

[4]

d) Name and briefly explain **THREE** different ways in which a VLAN can be established.

[6]

e) What is the improvement of Fibre Distributed Data Interface (FDDI) over the Token Ring?

[5]

Question 5

a) State which two of the following statements are true and which two are false and, for false statements, write out a corrected true statement:

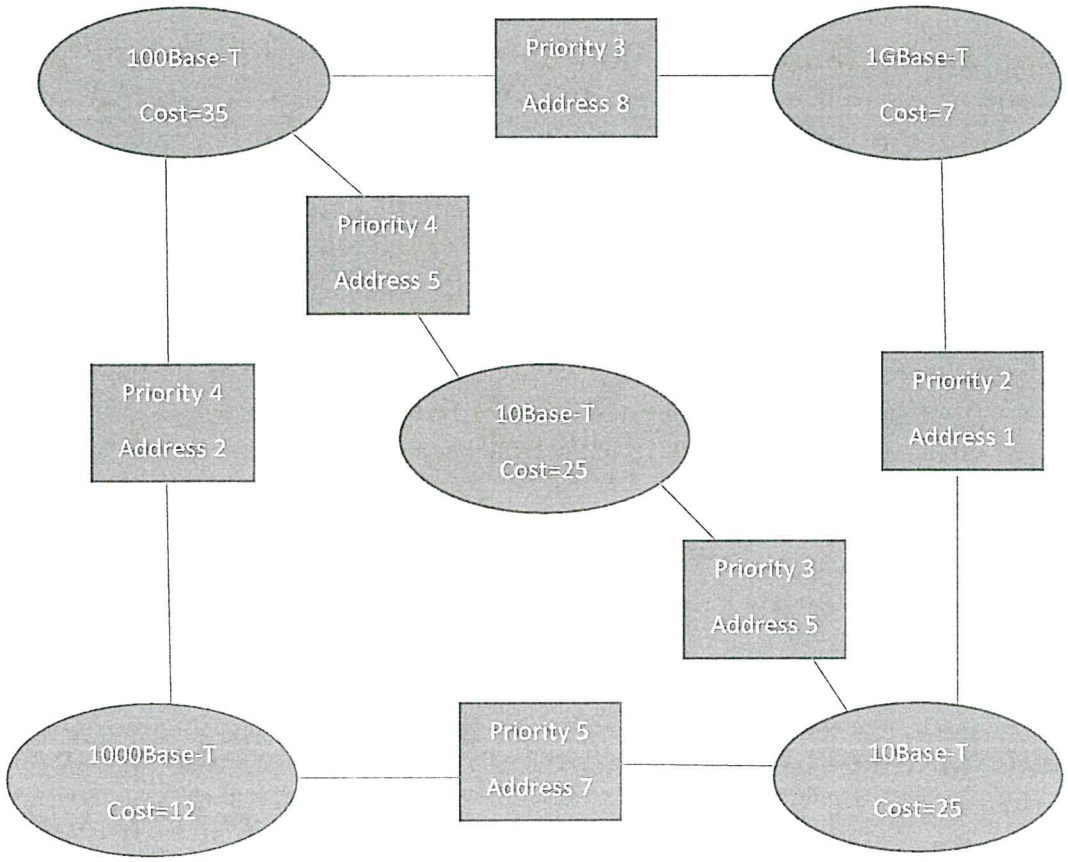
i. Universal Serial Bus (USB) operates on a master-slave protocol.
ii. Firewire is a peer-to-peer protocol.
iii. Bluetooth does not operate in the unlicensed 2.4 GHz wireless band.
iv. Fibre Channel supports only point-to-point topology. [4]

b) What are the reasons that WANs fail more often than LANs? [5]

c) What is the Frame Relay Protocol and why was it created? [5]

d) What are the **TWO** prerequisites for network layer internetworking? [4]

e) Use the Spanning Tree Protocol to determine which bridge ports should be blocked in the following LAN topology. Draw this diagram in your answer book. Show which bridge is elected as the root bridge by means of a thick lined box and show the path costs from each bridge port to the root bridge. Mark all the root ports with an R and all the designated ports with a D and all the blocked ports with an X. Draw the spanning tree with thick lines on the diagram. [7]



Question 6

a) State which two of the following statements are true and which two are false and, for false statements, write out a corrected true statement:

i. Traditional Ethernet uses a bus topology to connect the different stations.

ii. 10Base2 Ethernet uses a star topology.

iii. We can switch traffic in a VLAN.

iv. In Fibre Distributed Data Interface (FDDI), one ring is the primary ring and another acts as the stand-by.

[4]

b) How does static routing work and when would it be appropriate to use it – use an example to demonstrate your answer?

[7]

c) How do balanced hybrid routing algorithms work and what are their advantages?

[5]

d) How does streaming cut out jitter?

[4]

e) What problem does the building blocks network design methodology solve and how does it do it?

[5]

END OF PAPER