THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALL

UNIVERSITY OF LONDON

CO2222 ZB

BSc EXAMINATION

COMPUTING AND INFORMATION SYSTEMS

Data Communications and Enterprise Networking

Tuesday 7 May 2019: 14.30 – 17.30

Time allowed: 3 hours

DO NOT TURN OVER UNTIL TOLD TO BEGIN

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.

Calculators are not permitted in this examination.

UL19/0315

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. Signal to Noise ratio metric does not have any units.
ii. Multiplexing can be used for creating shared channels.
iii. Access network is only about end-users.
iv. Mesh networks offer strong resilience.

Note: half a mark will be deducted for each wrong answer.

[4]

b) Specify and briefly describe the bandwidth, throughput and noise quantitative characteristics of a channel – how can they be used?

[7]

c) What is jitter and in what kind of applications would it be particularly important to make sure it is minimised?

[4]

d) What is virtual switching, why might we want to use it and what are its sub-categories?

[5]

e) A team of engineers are looking at different configurations for a circuit they are building. They will be developing a 5.2kHz circuit where a signal can be carried with the usage of 64 signalling levels. What would be the maximum theoretical capacity of this channel?

[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. A network architecture is concerned with the layers and protocols of a network.

ii. A protocol header contains information relevant to the peer layer at the other end of the communications channel.

iii. Peer-to-peer protocols are asymmetric.

iv. Connectionless protocols can deal with flow control.

Note: half a mark will be deducted for each wrong answer.

[4]

b) What are three different attributes of protocol types? Briefly describe the characteristics of each category.

[6]

c) What are the two different types of transport service that the transport layer can offer to applications, and what are typical application examples for each type of transport service?

[6]

d) What is the main reason that SMTP is not well suited for delivering messages to clients?

[4]

e) What is the motivation behind NFS?

[5]

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. Telnet uses reliable Transmission Control Protocol (TCP) connections.
ii. HTTP/2 does support persistent connections with pipelining.
iii. Network File System (NFS) is used for transferring files.
iv. Lightweight-Directory Access Protocol (LDAP) is used in Active Directory (AD).

Note: half a mark will be deducted for each wrong answer.

[4]

b) What is supernetting, why is it needed and how does it work?

[6]

c) How would TCP compare against UDP in the case of applications that need to accept and send data – what options would the two protocols offer?

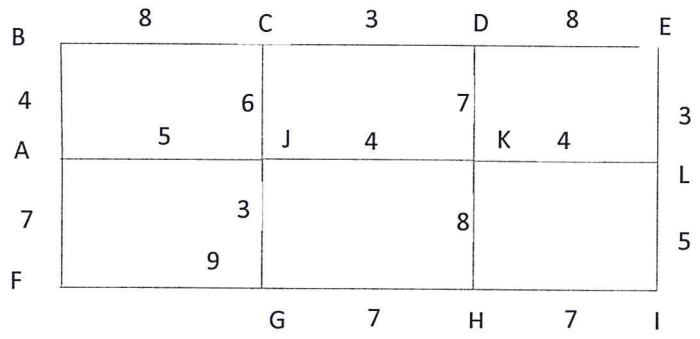
[4]

d) What is a problem that occurs with data link protocols and why does it occur?

[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

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. You can only have one company with differentiation strategy operating in a market.

ii. Market development as a growth strategy aims at going into niche markets.

iii. A network between a Personal Digital Assistant (PDA) and the user's mobile is a PAN network.

iv. Any two Firewire devices cannot communicate directly with each other.

Note: half a mark will be deducted for each wrong answer.

[4]

b) What are the five forces that drive competition within a market or a market segment? Briefly describe them and their influence.

[6]

c) What are the main factors used in the PEST analysis?

[5]

d) What are the main characteristics of Switched (or full duplex) Ethernets?

[6]

e) How can a network manager find out which VLAN a frame received from another switch relates to in a multi-switch VLAN?

[4]

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. In a source route bridge, when the host transmits a frame it must specify the path that it should take through the network.
   ii. In transparent bridges, hosts are involved in recalculating the best route in the case of a network failure.
   iii. A gateway is an internetworking device that can carry out on its own a translation between two protocols.
   iv. Exterior Gateway Protocol (EGP) is a Link State (LS) protocol.

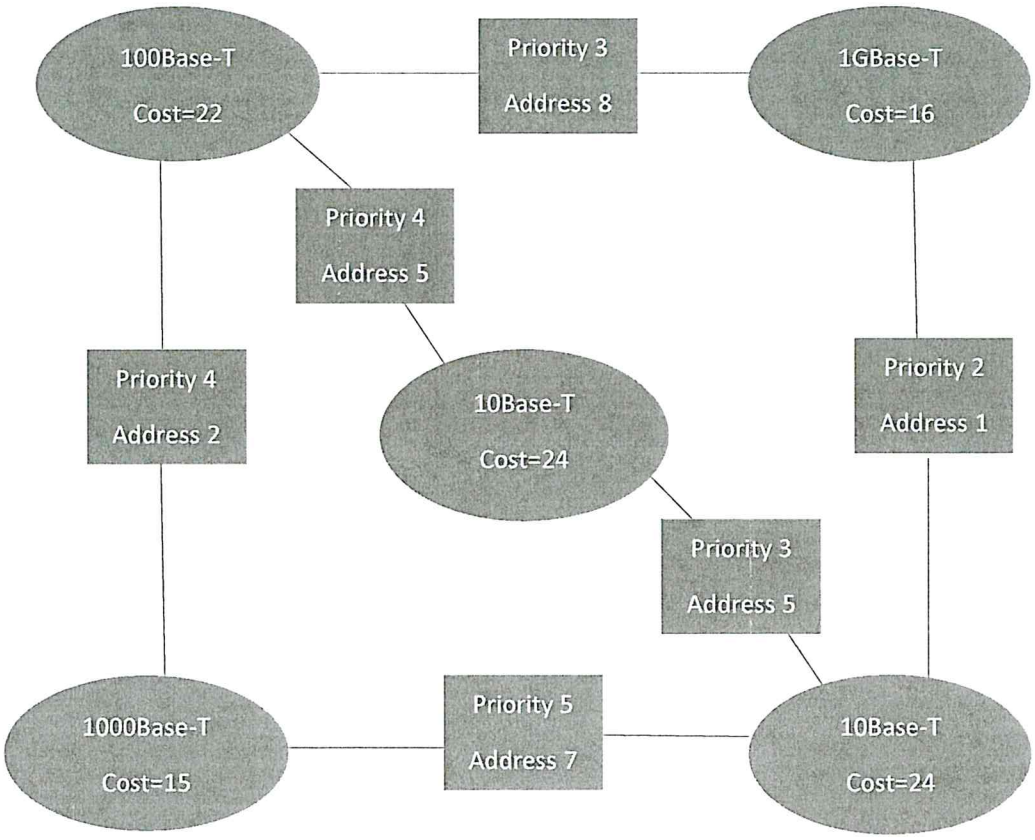
   Note: half a mark will be deducted for each wrong answer. [4]

b) How does the CSMA/CA method perform in WLANs? [5]

c) What are the advantages and disadvantages of the Switched Multi-megabit Data Services (SMDS) service? [5]

d) What is the process for deciding when a hand-off should take place in mobile networks? [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. Jitter in live multimedia can be overcome by streaming.
ii. Voice communication compression techniques can be used for music applications maintaining high quality.
iii. Network design is a heuristic process.
iv. Repeaters can offer good isolation of faults.

Note: half a mark will be deducted for each wrong answer.

[4]

b) How can we approach connecting two different connection-oriented networks together? What would happen with connectionless networks?

[6]

c) Why would a company consider building an extranet? Define what it is and how it can be implemented.

[5]

d) Why has switching become important?

[4]

e) How is cost involved in network design – what costs should be included?

[6]

END OF PAPER