THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALL

UNIVERSITY OF LONDON

CO2222 ZA

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.

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. Throughput is the maximum number of bits that can be accepted for delivery by the channel in one second.
ii. A point-to-point channel could be either dedicated or shared.
iii. An internetwork can be made up of incompatible computer networks
iv. Finding a fault in a tree network is easy.

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

[4]

b) What are the components of Shannon's communication model? Your answer should include a diagram to illustrate how they are connected.

[6]

c) What are three quantitative characteristics of a channel? Briefly describe them.

[6]

d) How do circuit and message switching work and how do they compare?

[5]

e) As part of a network transmission the 8-bit words 10110001 and 00101110 are transmitted along with a checksum value of 00001010. How would you use the Internet checksum at the receiving end to verify that the transmission is error-free?

[4]

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. Ring-Ring networks can offer high resilience.
ii. Open Systems Interconnection (OSI) model is an example of layered architecture.
iii. Protocol Data Units (PDUs) are made up of Service Data Units (SDUs) without control information.
iv. Quality of service is better with connectionless protocols.

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

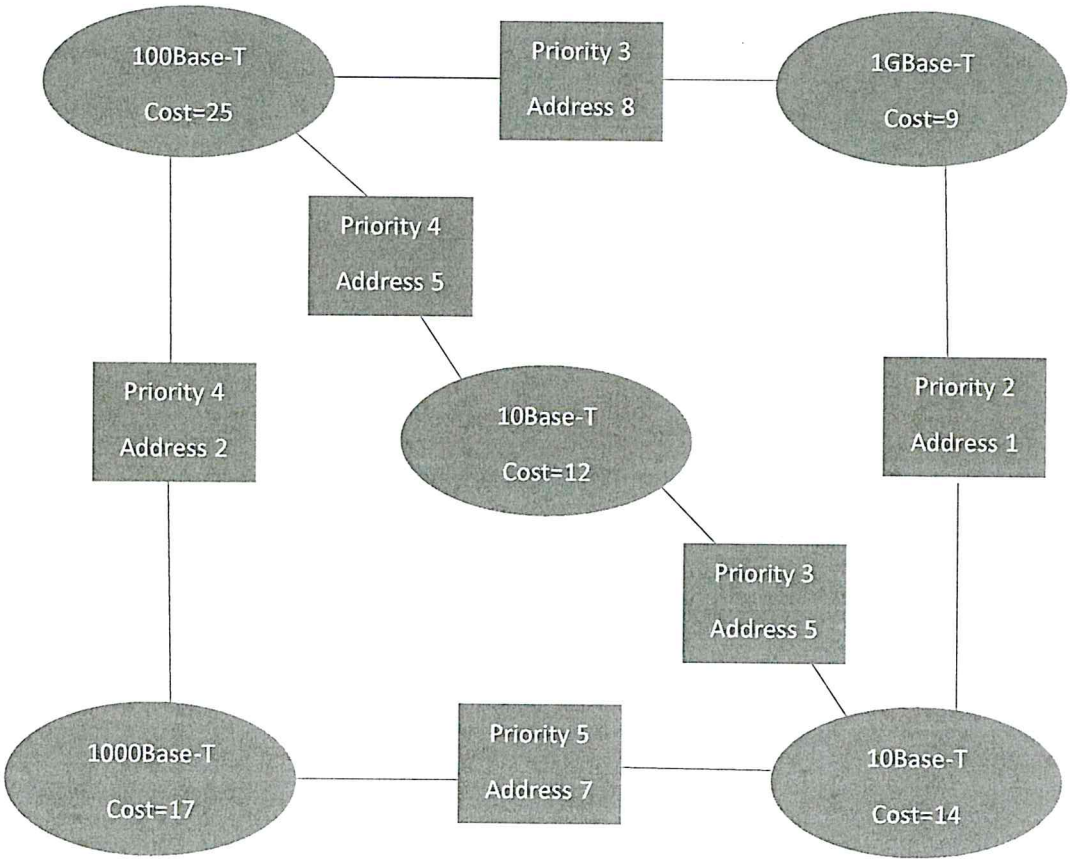
[4]

b) How is a layered architecture defined and what are its advantages?

[5]

c) 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]



d) What is the reason for using TFTP and what are some typical cases where it might be used?

[5]

e) Why is there a need for flow control and how would connection-oriented and connectionless protocols deal with this?

[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. Data encoding is one of the functions of the application layer.
ii. In-band signalling is completely transparent.
iii. SMTP is a real-time protocol.
iv. X.500 could support queries for any type of object, as long as it was stored in a Directory Information Base (DIB).

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

[4]

b) An organisation needs to allow members of the public to communicate securely with it. Explain how the organisation can use symmetric and public-key encryption to fulfil this need – you can use a diagram to illustrate your answer.

[7]

c) What are the main functionalities of the Internet Control Message Protocol (ICMP)?

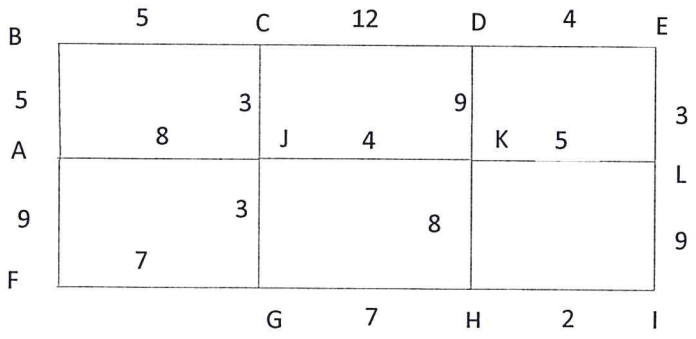
[4]

d) What are the two distinctive functions of the network layer?

[4]

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. Differentiation can be used as a strategy by a company to keep high prices.

ii. A company can keep generating profits from its cash cow's products for ever.

iii. We cannot classify networks in terms of range of distances over which they operate.

iv. In Bluetooth, if a CRC error is discovered, then the frame is discarded.

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

[4]

b) What are the general strategies for achieving competitive advantage and how do they compare?

[6]

c) What are the components of SWOT analysis?

[5]

d) What is the typical configuration of Bus Ethernets?

[5]

e) How does a VLAN address the problem of a broadcast storm?

[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. Basic Rate Interface (BRI) uses baseband transmission.
ii. Two similar connectionless networks can be connected by tunnelling through a connection-oriented network.
iii. Most routers are not multiprotocol routers.
iv. It is not possible to internetwork at the transport layer.

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

[4]

b) What are the steps in the CSMA/CA method for avoiding collisions in WLANs?

[7]

c) What protocols can be used by Switched Multi-megabit Data Services (SMDS) in terms of data link protocols and addressing? What would be the charging model?

[6]

d) What is the main weakness in the Public Switched Telephone Network (PSTN)?

[4]

e) What are the two main reasons for integrating technologies into a single network platform?

[4]

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. Access VPNs are provided by a single supplier.
ii. Reverse Path Forwarding (RPF) is used to prevent flooding.
iii. Huffman coding cannot be used for text compression.
iv. Real-Time Transport Protocol (RTP) has its own control protocol that allows streams like audio and video to be synchronised.

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

[4]

b) How can a network host learn the topology of the network and what could be the associated problem?

[6]

c) How does Rapid Spanning Tree Protocol improve upon Spanning Tree Protocol (what is the problem it is trying to solve) and what are the differences?

[5]

d) How is performance involved in network design and how can it be measured?

[4]

e) What is the definition of network design and how would we arrive at a good design?

[6]

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