UNIVERSITY OF LONDON

CO2222 ZB

BSc Examination

COMPUTING AND INFORMATION SYSTEMS

Data Communications and Enterprise Networking

Date and Time: Thursday 5 May 2016: 14.30 – 17.30

Duration: 3 hours

There are SIX questions on this paper. Candidates should answer **FOUR** questions (**TWO** from **PART A** and **TWO** from **PART B**). The mark 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 your first **TWO** answers from **PART B**, in the order that they appear in your answer book, will be marked.

There are 100 marks available on this paper.

No calculators should be used.

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.   TCP is a connection-oriented protocol.

    ii.   It is best to use connection-oriented protocols for real-time data.

    iii. Subnetting is the technique of using parts of the classful address for building additional networks.

    iv. Connection-oriented packet-switched networks set-up real dedicated circuits.

[4]

b) Define the terms noise and Signal To Noise Ratio providing the units each one of them is measured in (you can assume that the Baud rate is with five bit characters).

[4]

c) Identify and describe three different types of networks based on the hierarchical structure.

[6]

d) Explain how the data encoding issue is dealt with at the application layer with the Abstract Syntax Notation 1 (ASN.1).

[6]

e) Explain how Huffman codes work. Draw the tree and explain how the word **TREE** will be encoded will be encoded for the alphabet {A, E, L, N, R, T, V} using the following values:

A	1001
E	101
L	110
N	11101
R	111
T	01
V	00

[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.   LDAP is a lightweight version of X.500.
   ii. FTP is using in-band signalling.
   iii. POP3 protocol has an authentication phase.
   iv. SMTP (without extensions) can deliver 8-bit data.

[4]

b) Describe two basic types of transport that the transport layer can offer to applications.

[6]

c) Describe the process that will have to be followed by the Internet checksums method to verify that if the data received was 110 101 10 and 110 111 10 and a checksum of 101 101 01 with carry 1, then the data was received correctly.

[6]

d) How is the ordered delivery issue dealt with at the data link layer by connection-oriented and connectionless protocols?

[4]

e) What is a Media Access Control (MAC) address and what is its format – explain the different components of the format.

[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.   Password Authentication protocol is needed at all stages of the data link layer.

    ii.   There is a different Network Control Protocol (NCP) for each protocol that Point To Point (PPP) supports.

    iii. Ethernet frames must be at least 64 bytes long.

    iv. Pulse Amplitude Modulation (PAM) is used for sampling digital waves.

[4]

b) Describe three different types of the physical mediums at the level below the data link layer.

[9]

c) Describe three main types of medium access control methods that can be employed by the data link layer.

[6]

d) What is the purpose of the Link Control Protocol (LCP)? What are the options regarding the choice of authentication protocol when LCP establishes a link?

[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.   Firewire has a higher data transfer rate than USB.
   ii.   Network Attached Storage is more efficient for transferring raw data rather than whole files.
   iii. The Ethernet protocol can serve all types of address (unicast, multicast and broadcast).
   iv. There is a requirement for CSMA/CD in switched Ethernets.

[4]

b) Define three market segments for a business market and briefly explain how they can be categorised; you may provide examples to illustrate your answer.

[7]

c) What are the different ways in which a VLAN workgroup can be defined?

[5]

d) What is the Frame Relay Protocol, how does it compare to other similar protocols and how does it deal with error checking?
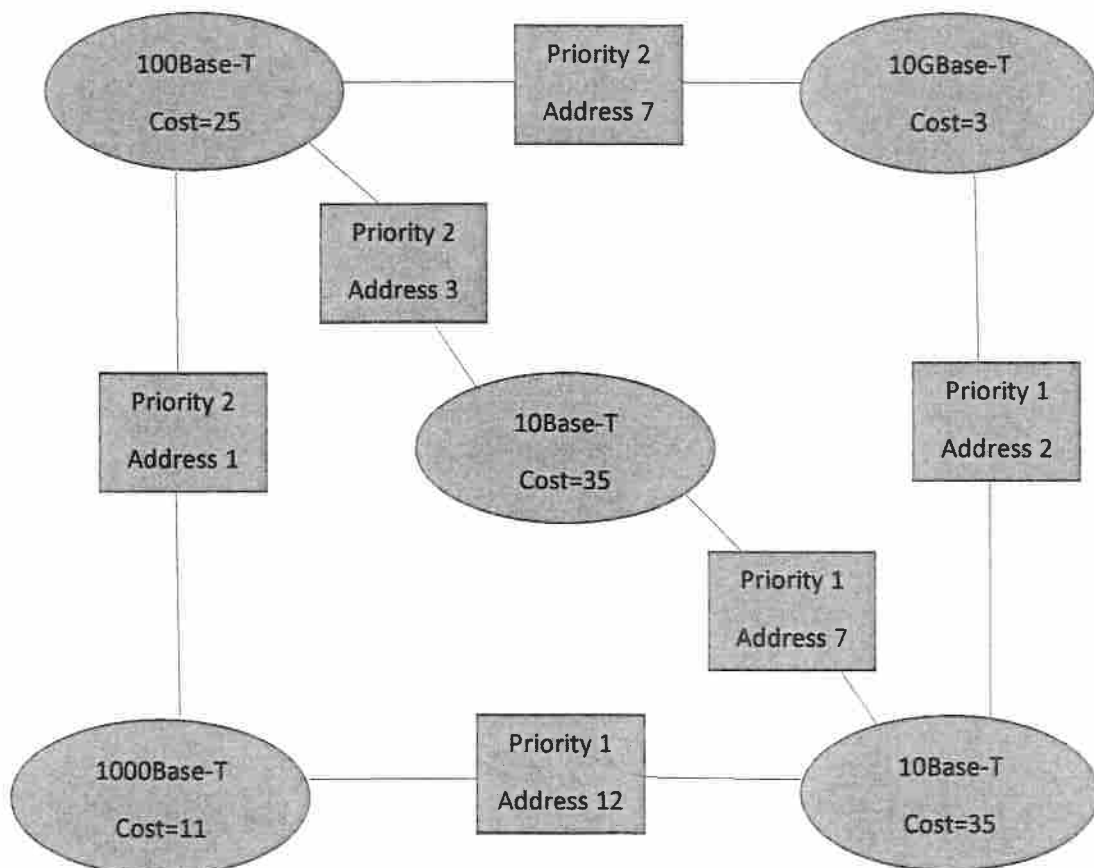
[9]

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. Frame Relay can correct errors when detected in frames.
   ii. ATM networks transmit variable size packets.
   iii. The fault detection process in network management can be automated.
   iv. It is not common for organisations to have third-line support in-house for network management.

[4]

b) Provide four reasons for the use of bridges in internetworking and briefly describe the context.

[6]

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.

[6]

d) What are the four different categories defined in a network hierarchy when looking at routing algorithms and protocols?

[4]

e) Briefly describe the Distance Vector (DV) routing algorithm, explain how it works and comment on its problems.

[5]

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.   Link State (LS) routing algorithms involve the exchange of routing tables between neighbours.

   ii.   Transport layer gateways can translate between different connection-oriented transport protocols.

   iii. An intranet can use private addresses all the time.

   iv. VPNs can be used to support access from anywhere to the company's Intranet or Extranet.

[4]

b) Describe the hot potato routing in isolated routing – what are its benefits and drawbacks?

[4]

c) What is the purpose of the Network Address Translation (NAT) function in the context of intranets? Briefly describe three problems associated with it.

[6]

d) 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.
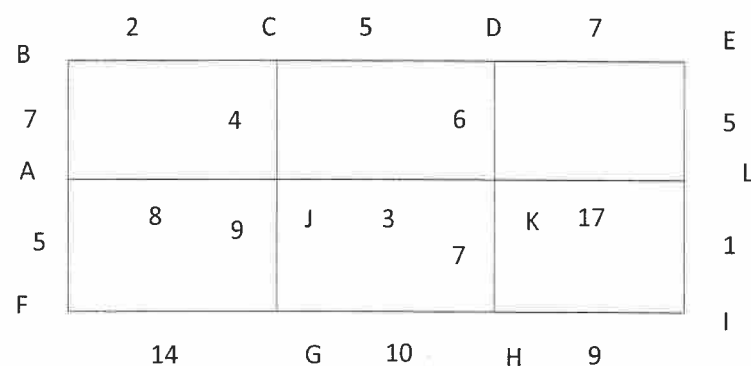
[5]

e) Describe how adaptive play-out delay works.

[6]

END OF PAPER