



UNIVERSITY EXAMINATIONS: 2013/2014
EXAMINATION FOR THE MASTER OF SCIENCE IN
DATA COMMUNICATIONS
MDC 6101 COMPUTER NETWORKS

DATE: AUGUST, 2014

TIME: 2 HOURS

INSTRUCTIONS: Answer Question One and Any Other Two Questions

QUESTION ONE: [20 Marks]

- (a) The delivery of packets of data on a worldwide network requires an addressing mechanism that is accepted worldwide. How is it achieved in the seven layer model?
- (b) Where in the seven layer protocol arrangement do we ensure that the destination receives the information dispatched by the sender? Outline how this may have been achieved.
- (c) The presentation layer has a data compression implementation responsibility. Why might we require such a facility as data compression? Where might it be useful to have data compression?
- (d) There are a number of issues which need to have been resolved when two computer systems attempt to exchange data. Identify as many of these issues as possible
- (e) Why is desirable to incorporate certain operating systems security functions directly into hardware? Why is it useful to microprogram certain security functions?

QUESTION TWO [15 MARKS]

- (a) Why are modern communications system more suited to switching small cells of data quickly to the destination than assembling large packets of data and routing them?
- (b) Routing within an individual LAN is not really an issue. However, if we link two bus structures with two bridges (one for redundancy/resilience), why does the internal addresses table become

important?

- (c) When a network designer has to tackle the internetworking problems and differences in protocols, there are a number of critical points that have to be resolved. Identify as many of these differences as possible.
- (d) You are the network manager for the CPA centre, and you are responsible for five networks. You have been asked to internetwork the five as soon as possible. What information should you have to achieve your goal of internetworking the five networks?

QUESTION THREE [15 MARKS]

- (a)
 - (i) Why is a dynamic routing preferable to static routing in an ATM network?
 - (ii) Why has the ATM standard allowed any layer 1 service to carry the traffic rather than being precise about the network structure.
- (b) Compare and contrast the notions of peer-to-peer network architecture and hierarchical network architecture. Which is better for network management? Which offers greater flexibility in resource sharing? Why do you suppose most OSI relationships are peer to peer?
- (c) One interesting problem that occurs in distributed control, token-passing systems, is that the token may get lost. Indeed, if a token is not properly circulating around network, no station can transmit. Comment on the problem. What safeguards can be built into a token-passing network to determine if a token has been lost, and then to restore proper operation on the network

QUESTION FOUR [15 MARKS]

- (a) Explain how public key cryptography systems provide an effective means of implementing digital signatures
- (b) Outline the major advantages and disadvantages of a layered approach to designing networks.
- (c)
 - (i) What are the differences and similarities between a logical ring topology and a physical star topology?
 - (ii) What is the rationale for physically installing LAN cabling in the topology of a star?
- (d) How do we sell the benefits of being part of the network community to a user who has always enjoyed his/her independence and freedom and feels that conforming to network user regulations is an important?