DUBLIN INSTITUTE OF TECHNOLOGY

DT211C BSc. (Honours) Degree in Computer Science (Infrastructure)

Year 1

WINTER EXAMINATIONS 2015/2016

NETWORKING 1 - FUNDAMENTALS [CMPU1021]

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FRIDAY 15TH JANUARY 9.30 A.M. – 11.30 A.M.

TWO HOURS

INSTRUCTIONS TO CANDIDATES

ANSWER **THREE** QUESTIONS OUT OF **FOUR**.

ALL QUESTIONS CARRY EQUAL MARKS.
(A discretionary mark of 1 is awarded for a maximum of 100)

1. (a) The following acronyms have been extracted from the networking glossary; ***DNS, DHCP, SMTP*** and ***ARP***.
   (i) State the full version of each acronym.
   (ii) Briefly describe the function of each.

[16 marks]

(b) ***Draw*** the OSI 7 layer Reference Model diagram and the TCP/IP model clearly showing its alignment with the OSI reference model.

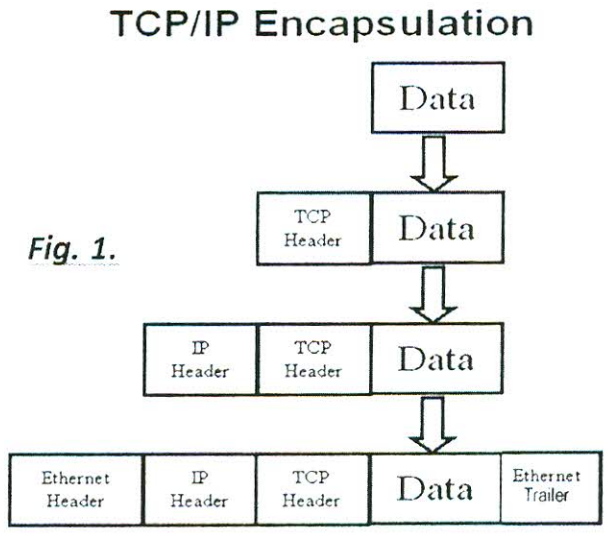
[8 marks]

(c) There are three distinct network message delivery options when sending data from a source to destination(s). Name each and give a brief description using a diagram.

[9 marks]

2. (a) Fig. 1. shows a diagram of TCP/IP encapsulation. Briefly describe the ***main information*** that makes up the contents of the header/trailer at each layer.
Name the Protocol Data Unit (PDU) used at each layer.

Fig. 1.



[20 marks]

(b) TCP/IP provides two transport layer protocols; TCP and UDP. Compare and contrast the operation of the TCP and UDP protocols giving an example of the type of communications where they are both used.

[13 marks]

3. (a) Explain briefly the purpose of *Media Access Control* methods.

Describe the following access methods used in Local Area Networks (LANs):

(i) Controlled.

(ii) Contention.

[10 marks]

(b) Describe the operation of a Layer 2 Network Switch explaining how it fills its address table and how it makes forwarding decisions.

[14 marks]

(c) Explain the terms *bandwidth, goodput* and *throughput*.

[9 marks]

4. (a) Given the following host IP addresses 192.168.10.32/28

(i) What is the subnet mask (in decimal) for this network?

(ii) How many bits have been borrowed to create this subnet?

(iii) What is the network address of this subnet?

(iv) What is the broadcast address of this subnet?

(v) What is the usable host address range for this network?

(vi) How many usable host addresses are on this network?

[12 marks]

(b) There are currently two versions of Internet Protocol (IP): IPv4 and IPv6. Briefly describe the major characteristics of IPv6 as compared to IPv4.

[14 marks]

(c) Given the following IPv6 address, **2001:0DB8:00A0:0100:0000:0000:0000:0010**.

Rewrite this address in valid compressed form.

[7 marks]