

**OLLSCOIL NA hEIREANN, CORCAIGH
THE NATIONAL UNIVERSITY OF IRELAND, CORK**

**COLAISTE NA hOLLSCOILE, CORCAIGH
UNIVERSITY COLLEGE, CORK**

**Autumn Examination 2010
Second Science**

**Computer Science
CS2505 – Network Computing**

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You may use a calculator.
Attempt all four questions.
This examination is worth 70 module marks.

Time allowed: 1.5 hours

Question 1: General Networking Concepts [10 marks]

Each sub-question below is worth 2 marks. Answer either *True* or *False* in each case.

- a) TCP provides reliable delivery.
- b) Congestion is said to occur when queues in routers overflow.
- c) The software implementing the DNS Domain Name Service is executed on Internet routers.
- d) HTTP uses binary rather than text to encode its messages.
- e) The Internet is based on the principle of packet switching.

Question 2: Networking Fundamentals [20 marks]

- a) What are the five layers of the Internet protocol architecture? List the principal responsibilities of each layer. [10 marks]
- b) Consider a 50Kb/s link to an interplanetary spacecraft. The distance to the spacecraft is approximately 2,232,000 miles and data travels over the link at the speed of light – 186,000 miles per second. The spacecraft takes a photo that is compressed to size 500Kbytes. How long does it take for the photo to be delivered over the link? [10 marks]

Question 3: Application Layer [20 marks]

- a) Expand the acronym SNMP and draw a diagram showing the key SNMP elements. [6 marks]
Show using examples the two main ways in which the SNMP protocol is used to access a MIB. [4 marks]

- b) Draw a diagram showing (in their correct sequence) the four protocol headers in a packet as it would be sent across an Ethernet link to a file transfer server, having traversed the Internet from a file transfer client. [4 marks]
Compare Peer-to-Peer file distribution to the more conventional use of a centralised file server. [6 marks]

Question 4: Transport Layer [20 marks]

- a) The figure below shows the TCP header (without options). For each field briefly explain how its value is determined *and* how it is used. [12 marks]

0	4	10	16	31
SrcPort		DstPort		
SequenceNum				
Acknowledgment				
HdrLen	0	Flags	AdvertisedWindow	
Checksum			UrgPtr	

- b) TCP uses a sliding-window protocol. Consider two hosts, A and B, with an open TCP session. A sends a segment with sequence number 2600 and after some time receives a segment from B with sequence number 22500 and acknowledgment number 3600.
 - i) How many bytes were received and confirmed by host B? [4 marks]
 - ii) Is there a relationship between the values of the two sequence numbers? Explain your answer. [4 marks]