

**Ollscoil na hÉireann, Gaillimh**  
**National University of Ireland, Galway**

**Semester II Examinations, 2004/2005**

Exam Code(s)	1SD1
	IMF1
Exam(s)	HIGHER DIPLOMA in APPLIED SCIENCE (SOFTWARE DESIGN & DEVELOPMENT) M.Sc. in SOFTWARE DESIGN & DEVELOPMENT
Module Code(s)	CT517 CT866
Module(s)	COMPUTER COMMUNICATION
Paper No.	1
Repeat Paper	Special Paper
External Examiner(s)	Prof. D. Bell
Internal Examiner(s)	Prof. G. Lyons Dr. M. Schukat

**Instructions:**

**Candidates taking CT517 or CT866:**

Time allowed: TWO hours

Answer any 3 questions. All questions carry equal marks.

Duration	2 hrs
No. of Answer books	

**Requirements:**

Handout	
MCQ	
Statistical Tables	
Graph Paper	
Log Graph Paper	
Other Material	

No. of Pages	3
Department(s)	Information Technology

- Q1. (a) Describe the *OSI reference model*.  
What are the advantages of a layered network architecture? (10)
- (b) Distinguish between *bit-rate* and *baud-rate* and describe the concept and benefits of *Quadrature-Amplitude Modulation (QAM)*. (10)
- (c) Describe the various steps an *analog-to-digital encoder* performs in order to convert an analog signal into a digital signal. (10)
- Q2. (a) *Framing* is one of the essential functions of the Data Link Layer (DLL). Distinguish between the 3 framing concepts  
- character count  
- start/finish ASCII characters  
- start/finish bit flags (10)
- (b) Show how *line discipline* can be achieved both  
- in a two-station scenario and  
- in a multi-point scenario consisting of one primary station and two secondary stations. (8)
- (c) *Error control* is another function of the OSI Data Link Layer (DLL). Distinguish between the three error control techniques  
- stop-and-wait ARQ  
- “go-back-n” sliding window ARQ.  
- “selective-reject” sliding window ARQ (12)
- Q3. (a) Give a brief definition of a *LAN (Local Area Network)*. (4)
- (b) Compare the two IEEE 802 standards *802.3 (CSMA/CD)* and *802.5 (Token Ring)*. Outline the strengths and weaknesses of both standards. (14)
- (c) Explain the “*basic bit-map*” collision-free protocol. (12)

- Q4. (a) Distinguish between a *datagram subnet* and a *virtual-circuit (VC) subnet*. Outline the advantages and disadvantages of both technologies. (9)
- (b) Using a simple example, explain the general operation of the *Shortest Path Routing Algorithm*. Why is this algorithm a *static* routing algorithm? (12)
- (c) Using an example show the advantages and disadvantages of *hierarchical routing*. (9)
- Q5. (a) Many Internet applications utilise the transport layer protocol *TCP (Transmission Control Protocol)* to provide reliable data transfer. Describe how TCP provides this quality of service. (12)
- (b) What is the purpose of *window management* in TCP? Use an example to illustrate the answer. (9)
- (c) Describe the *three-way handshake* used by TCP to set up a connection. (9)
- Q6. (a) Describe the concept and the structure of the *DNS (Domain Name System)*. Give an example of where this service is used. (12)
- (b) Describe the *Simple Mail Transport Protocol (SMTP)*. (9)
- (c) Distinguish between the following firewall types:  
 - packet filtering router  
 - application-level gateway  
 - personal firewall software solution. (9)