# Principles of Communications

## Supervision Questions Set 1:
## Systems and Layering

Marks are given for guidance only. The exam questions are intended to be optional and it is left up to your supervisor whether they will require you to do them or not.

July 2012

1. A communication system is generally made up of the following elements. Describe the function of each element and how it interacts with the system as a whole *(10 Marks)*:

   (a) Sender

   (b) Receiver

   (c) Message

   (d) Channel

   (e) External Constraints

2. System Design is the art and science of combining a number of different elements/resources into a complete system that functions as efficiently as possible. Typically resources can be quantified by a combination of Time, Space, Computation, Money and Labour. For each of the following design approaches explain the trade-offs that are being made and give a practical example of where the approach might be used *(6 Marks)*:

   (a) Multiplexing

   (b) Batching

   (c) Pipelining

3. (a) Explain what is meant by the terms Abstraction, Hierarchy and Virtualisation. For each give an example of their use within a communications system *(6 Marks)*.

   (b) Describe the difference between soft and hard state *(2 Marks)*.

   (c) In the context of the Internet, give an example of each of explicit and implicit state notifications *(2 Marks)*.

4. (a) List the 7 layers of the OSI protocol model. For each layer include a description of the functions and give an example protocol *(10 marks)*

   (b) TCP/IP is often described as a 4-layer model. Give the 4 layers and show how this fits into the 7-layer model *(4 Marks)*.

5. (a) Explain why layering is such a powerful design approach for the Internet *(4 Marks)*.

   (b) What is meant by layer-violation? Give an example of where you might want to do this *(3 Marks)*.

   (c) Describe how the end-to-end principle relates to the concept of layering *(3 Marks)*.

## Exam Questions

2012 Paper 7, Question 8(a)
2008 Paper 7, Question 3