D59 Exam 1997

2.5 Hours,
Calculators not needed.
(The use of diagrams in answers is encouraged):

Work ALL based on notes/lectures, provided students follow through
the quantitative (back of envelope) calculations!

Question 1/
i) CCIR 601 PAL/NTSC
gives parameters of 625/50 and 525/50
for the line rate and field rate.
Given this, and YCC 422 sampling of the
Luminance and two Chrominance values, that results in
12 bits per point on the screen, explain
a) How the bandwidth of the digitised signal of 210 Mbps [10]
b) How the bandwidth of the digitised video of 140Mbps [10]
ii) Describe in general terms, compression methods to step this down to
  a) 34Mbps [3]
  b) 2-6Mbs [10]

Question 2/
i) The principle components of the World Wide Web are
the URL, MIME, HTML and HTTP - explain their roles with simple
examples. [10]

Assuming that HTTP operates on TCP with the following parameters:
Average Web page size = 4000 bytes
Average TCP connection takes 3 packet setup, 3 packet teardown, and data PDU Is 512 bytes

ii) What is the typical load on the network from downloading a
page in a second? [10]
iii) How does proxy caching improve the performance of fetching a Web page?
[10]
iv) How do active pages, such as those implemented as Java applets, both
decrease, and occasionally increase the amount of Web Traffic on the network.
[3]

Question 3/
i) Compare the function of an MCU with the use of multicast for
multi-party videoconferencing - explain, with the aid of diagrams
and simple arithmetic, how the amount of conference
control messages on the network differ and how the amount of
information varies that is held at each participant in the dense
mode multicast Internet case, and the MCU ISDN case for a simple
example scenerio of a 4 way conference.. [15]
ii) How does each type of system scale with regard to the number
of senders, and the number of receivers, and how is this potentially
different for

- audio
- video
- whiteboard type applications

[18]

Question 4/
Identify the major advantages and disadvantages from a user's
perspective of the use of THREE of the following forms of multi-media:-

a. hyper-text b. video c. voice d. animation (20% of marks each)

An education authority want a multi-media system to distribute to
secondary schools to support education about the dangers of drugs.
Outline a process for establishing the requirements and for designing
and evaluating this system. (40%)

Question 5/
a) Describe the DSP Operations involved in the Digitisation of Real-time

media, such as audio. Include in your answer what you think is meant by Sampling Frequency, Quantisation and Aliasing. What effect has digitisation had on the spectrum of the signal? [12 marks]

b) Describe the ADPCM coding algorithm. Which speech characteristics are being exploited in this codec to give a bit rate reduction? [11 marks]

c) ADPCM is used in packet speech systems as well as PCM. What do you think is the aim of increasing the compression level in a packet speech system. What disadvantage is usually associated with a change in compression? What is the impact on the perception of packet loss? [10 marks]