ไม่อนุญาตให้นำเอกสารเข้าในห้องสอบ

In each question a student can choose to answer either part 1 or part 2 of the question. Each part carries equal mark
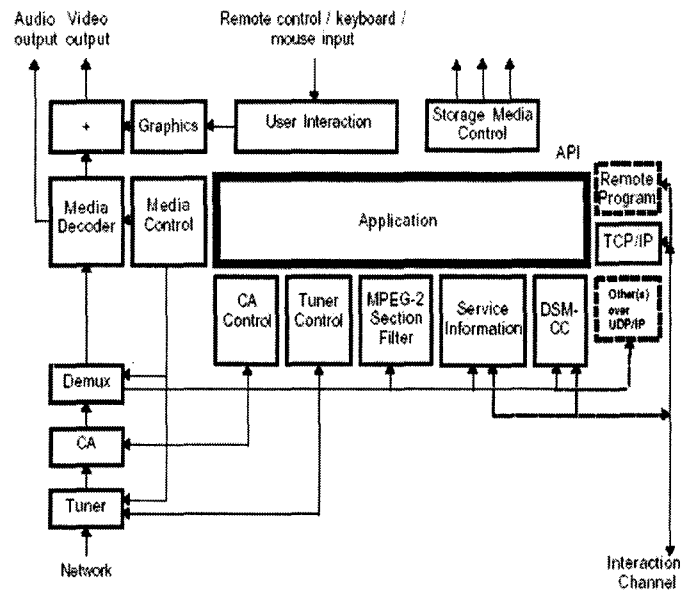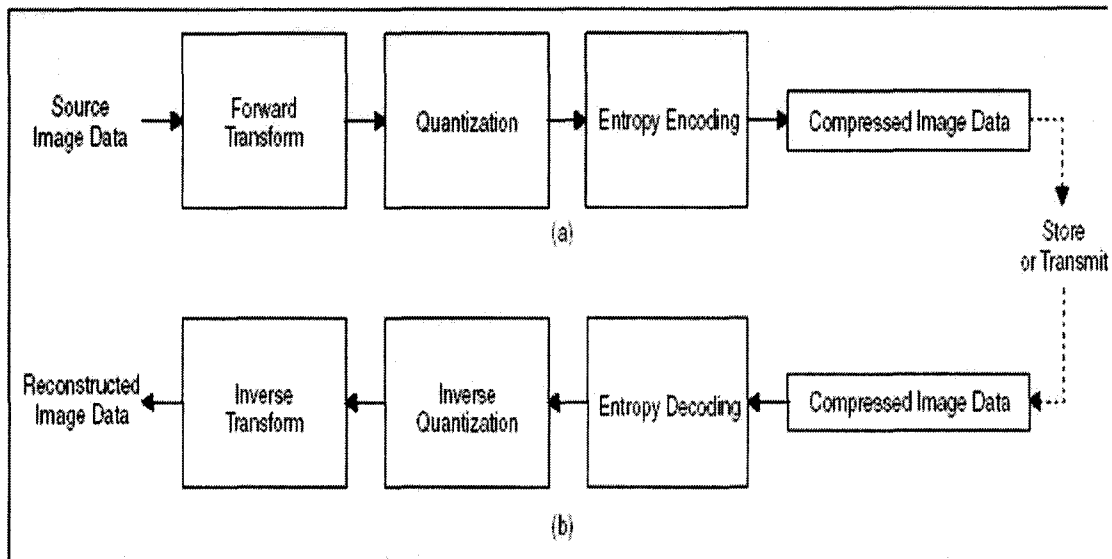
Question 1. (20 marks)
Part1.1.

     (a) Give a definition of *multimedia* and a *multimedia system.*

     (b) What are the key distinctions between multimedia data and more conventional types of media?

     (c) What key issues or problems does a multimedia system have to deal with when handling multimedia data?

     (d) An analog signal has bandwidth that ranges from 15Hz to 10 KHz. What is the rate of sampler and the bandwidth of bandlimiting filter required if:

         (i) the signal is to be stored within computer memory.

         (ii) the signal is to be transmitted over a network which has a bandwidth from 200Hz to 3.4 KHz.

     (e) Assuming that each signal is sampled at 8 bits per sample what is the *quantization noise* and the *signal to noise ratio* expected for the transmission of the signals in (d)(i) and (d)(ii).

Part 1.2

From the given figure , explain interfacing between the Multimedia Home Platform(MHP) applications and the MHP system.(Figure 1.2.1)

1.2.2. From the given figure 1.2.2 explain the JPEG 2000 encoder and decoder.

Figure 1.1.2

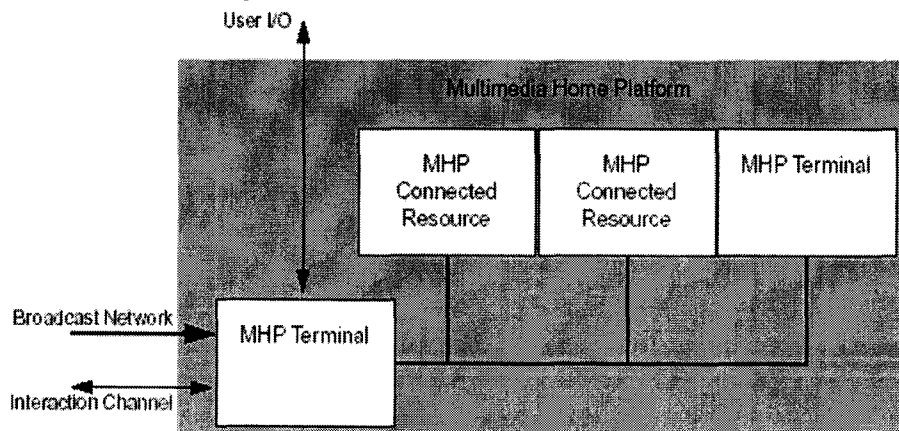**Question 2.** (20 marks)

Part 2.1

(a) When designing multimedia systems, what *two levels of functionality* need to be considered? Briefly define these levels.

(b) For each common multimedia data type discuss what common functionalities should be supported by a multimedia system.

(c) You have been commissioned to produce a Multimedia mail system. What media should be supported in such a mail system and how should an application facilitate assembly, delivery and reading of the mail?
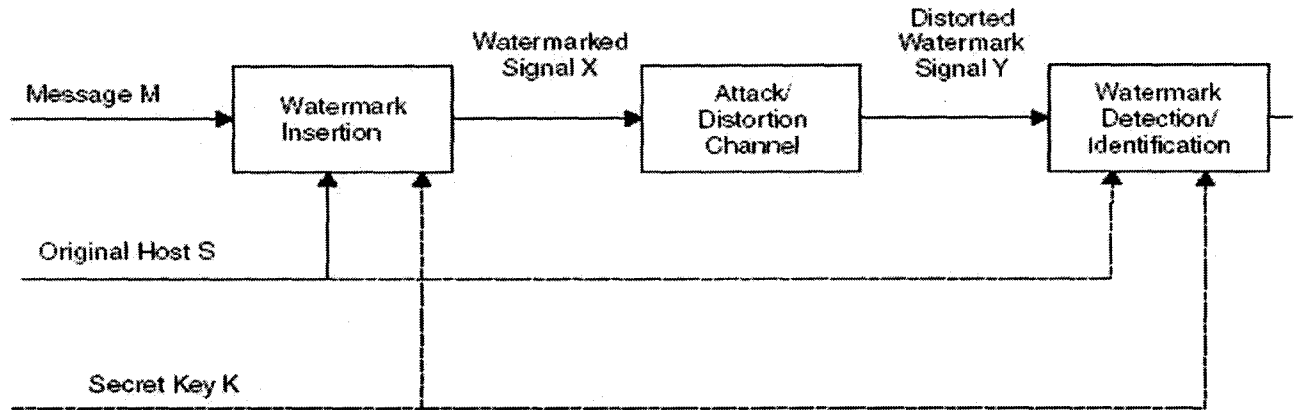
Part 2.2

2.2.1.From the figure 2.2.1 explain the MHP platform and its interfacing with the outside world.   **Figure 2.2.1**

2.2.2 From the figure 2.2.2 explain the water marking system.

Figure 2.2.2

Question 3. (20 marks)
Part 3.1
A piece of music that lasts 3 minutes is to be transmitted over a network.
The piece of music has 4 constituent instruments: Drums, Bass, Piano and
Trumpet. The music has been recorded at CD quality (44.1 Khz, 16 bit,
Stereo) and also as MIDI information, where on average the drums play
180 notes per minute, the Bass 140 notes per minute, the Piano 600 notes
per minute and the trumpet 80 notes per minute.

> (i) Estimate the number of bytes required for the storage of a full
> performance at CD quality audio and the number of bytes for the Midi
> performance. You should assume that the general midi set of
> instruments is available for any performance of the recorded MIDI
> data.
> (ii) Estimate the time it would take to transmit each performance over a
> network with 64 kbps.

Part 3.2

3.2.1 From the figure 3.2.1 explain the authored event mechanism of authored event of the Multimedia Home Platform(MHP)
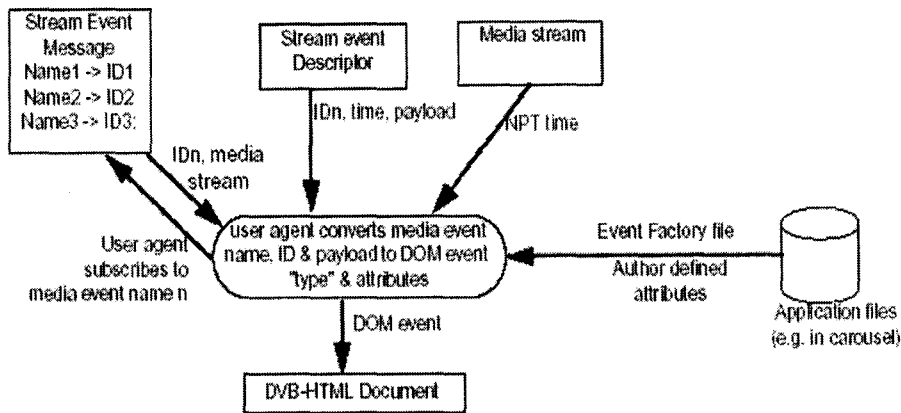
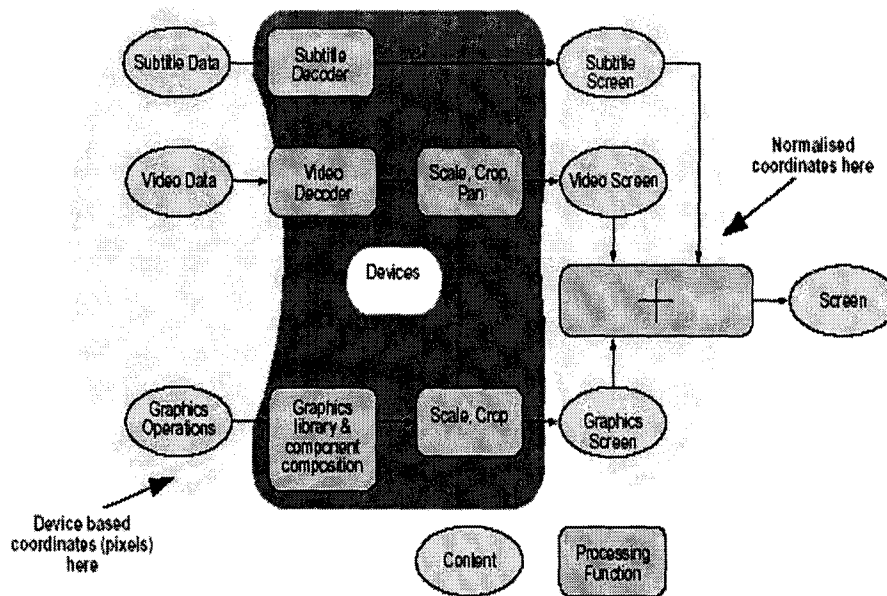**Figure 3.2.1**
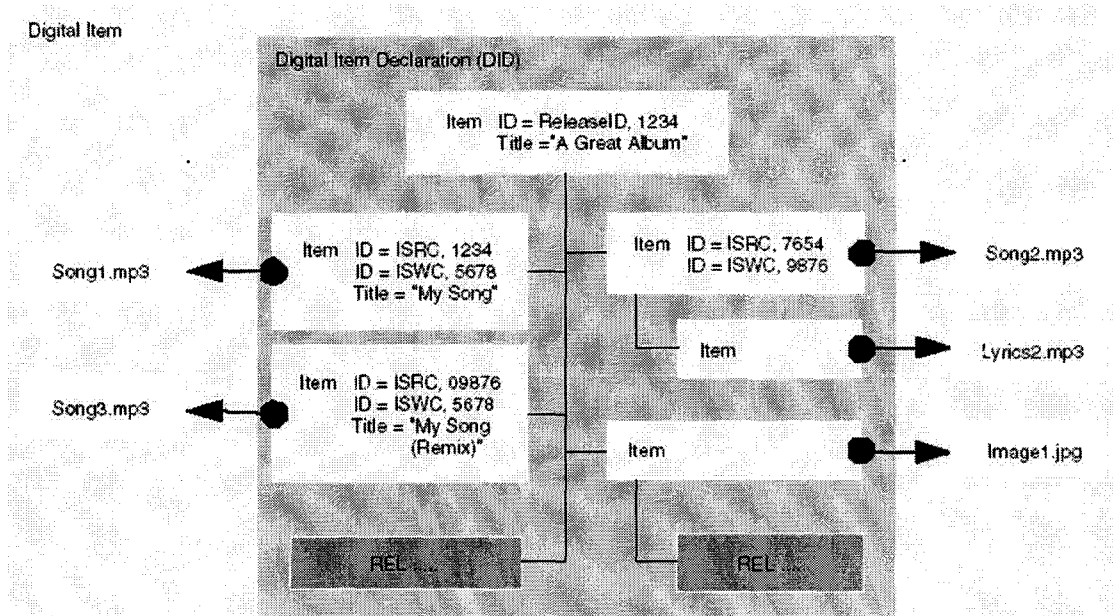
figure 3.2.2

3.2.2.From the figure 3.2.2 explain how a simple digital item is represented in a Digital Right Management(DRM) system.

Question 4. (20 marks)
Part 4.1
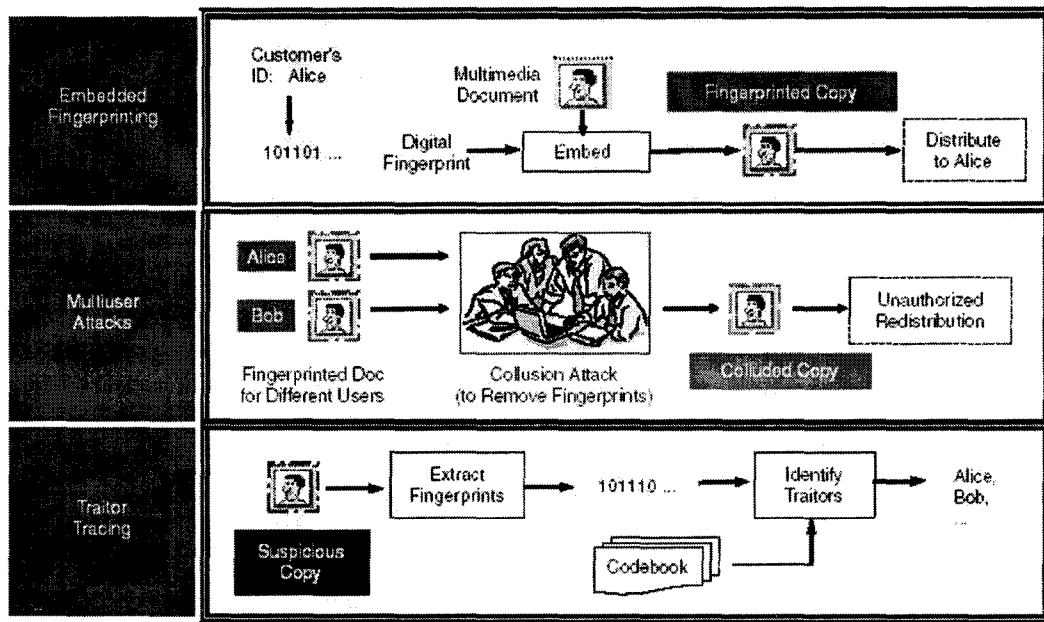Explain how Public Key Infrastructure works. (hint: draw a diagram)

Part 4.2
4.2.1. From the figure 4.2.1 explain how the coordinate spaces of the Multimedia Home
Platform(MHP) work.

Figure 4.2.1

4.2.2 From the figure 4.2.2 explain the techniques for using embedded finger printing for
tracing users in a multimedia document.

Figure 4.2.2

Question 5. (20 marks)
Part 5.1
Using the Simple encryption by substitution, the word "informationengineering" is coded as:

a	b	c
d	e	f
g	h	i

(without dot)

j	k	l
m	n	o
p	q	r

(with dot)

s
t   u
v

(without dot)

w
x   y
z

(with dot)

Part5.2
5.2.1 From the figure 5.2.1 explain format control in TV mode using MPEG of MHP system.

Figure 5.2.1

MPEG Video Data ──→ [MPEG Video Decoder] ──full screen──→ [Decoder Format Conversion] ──→ Video to graphics integration then display

Various broadcast meta data

**Logical input video source
as reported by the ETR 154**

Format signalling to display ──→

User preference ──→ [TV Behaviour Control]

Display knowledge ──→

[Application Behaviour Control]