Question 23 Communications Systems

(a)

(i) **2 marks**

Upload to server @ 250 kilobit = 250 * 1024 bits **(1/2 mark)**

Download from server @ 10 megabit = 10 * 1024 * 1024 bits **(1/2 mark)**

5 min 20 secs = 320 secs **(1/2 mark)**

$$= \frac{250 \times 1024}{10 \times 1024 \times 1024} \times 320 \text{ seconds} \quad \textbf{(1/2 mark)}$$

$$= \frac{250 \times 32}{1024} \text{ seconds}$$

– approx 8 seconds

...OR...

250x320 **(1/2 mark)**

PhoneNet = 80,000 kilobits **(1/2 mark)**

Ethernet – 10x1024 kilobits

= 10240 kilobits **(1/2 mark)**

Time – $\frac{80{,}000}{10240}$ **(1/2 mark)**

= approx 8 seconds

(ii) **Which cable is faulty? 1 mark**

It is the PhoneNet cable between the Manager's and the Clerk's PhoneNet transceivers.

(iii) **Alternatives to copper in a WAN. Advs and Disadvs 4 marks**

(1 each for each point) - Radio and Infrared not accepted for WANS.

Satellite		Optic Fibre		Microwave	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**
High bandwidth so more data can be carried per second	Microwaves affected by weather and objects in line-of-site	Higher data speeds than copper	cost per meter is higher	High bandwidth so more data can be carried per second	Microwaves affected by weather and objects in line-of-site
			Accessories cost a lot as they are optical		
			heavier and thicker so harder to work with		

(b) Packet passing through the switch? 1 mark

D ... Programmer to Black and White Printer

(c)

(i) Where should we plug in the CASUAL user so they have fastest access to the file server 1 mark

Plug *Casual* into one of the two spare connections available on the **Hub**.

OR... plug into the only connection on the switch/gateway **(1/2 mark)** as there is one extra device for the data to pass through so there would be some processing overhead required to slow down the data.

(ii) 3 marks 6 x 1/2mk for each of 6 points

Hardware	Software
separate computer to run the web site, connected to the network	web serving software on web server computer
Internet router to connect Internet to office network	web browser software on all office machines
modem to connect office network to internet/ Individual modem for each computer!!!	firewall software on router or web server

(iii) 3 marks 3 x 1mk for each of three points

There is now a communications link from the outside world via the Internet into the company's network.Conceivably, anyone outside can access staff computers and particularly the file server.

Social & Ethical Issues...

Privacy - there may be personal information about employees on the network, salaries, company sensitive documents etc.

Use of a firewall is one method of preventing access through the Internet into the LAN. This restricts and filters the data going into the LAN. Another method is the use of a username and password system within the LAN. Outsiders who get into the LAN will be prevented from accessing the file server due to the password security.

Question 25 Multimedia Systems

(a) **2 marks (any 4 correct at 1/2 each)**

Other than sound, other media used in multimedia

Text, Hypertext and numbers

Images and/or animations

Video

(b) **4 marks (1 for diagram and 6 x 1/2 mark for any six points)**

Recording and storing sound for multimedia (in detail)

In nature, sound is an analog signal. To be used in computers and specifically in a multimedia project, sound needs to be converted into a digital form of sound, as computers work solely in digital.

Recording of Sound

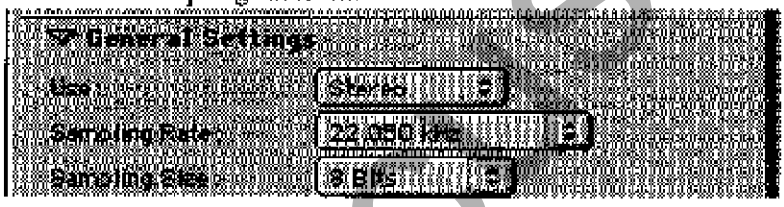
This is the process of converting analog sound into digital sound.

Sound already in digital form does not need to be recorded/converted. These include -

- any sound or music on a CD-ROM or Mini Disk (which use digital technology already)
- any music or sound that is already a computer file (ie stored on a computer storage device)

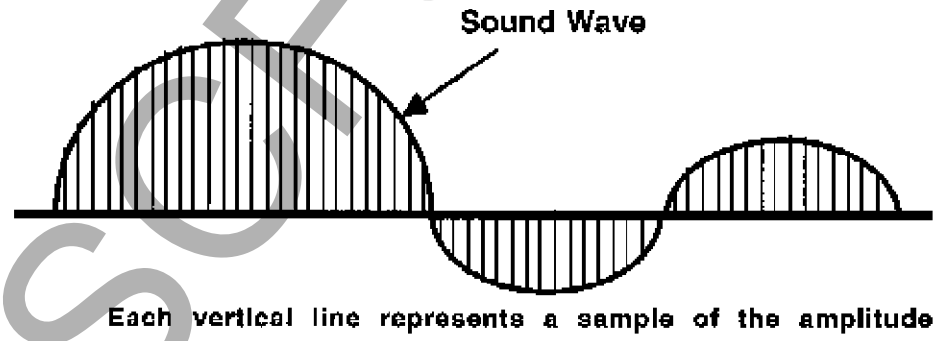
Converting analog sound to digital sound (digitising) uses the process of **sampling.**

Digitising sound involves 3 sampling factors...



1. Sample Rate

Sound is digitised by the computer taking regular samples of the sound wave and the amplitude determined. This data is stored as binary. The sampling rate is how frequently the sound wave is sampled. 22.05 kHz and 44.1 kHz (CD's) are the most common sampling rates.



2. Sample size

Each sample of sound is stored as bits (1s and 0s). The more bits that are used to represent each sound sample, the better the sound quality. Thus sound can be sampled at 8 or 16 bits per sample, the final choice also affecting the final file size.

3. Stereo or Mono

Stereo sound involves a left and right channel of sound which gives the sound a more realistic nature. If the sound source is stereo and you wish it to be digitised as stereo, this can be selected.

All sampling occurs in the sound circuitry inside the computer. This might be on a separate sound card in the computer, or it might be soldered onto the motherboard of the computer.
Your sound source could be -
- a cassette player
- a microphone
- a VCR (to obtain the sound track)

You plug the sound source into the sound-in connection at the back of the computer and the sound circuitry does the digitising. Sound software running on the computer displays the result of the digitised sound and allows you to edit and/or store the sound in various sound file formats.

Storage of Sound

Sound is stored as binary computer files on secondary storage devices. Sound files are frequently very large due to the amount of data that is collected and digitised for each sample thus the storage devices need to be large capacity. A small amount of sound can only be stored on a floppy disk of 1.4 megabytes (Mb)capacity. Secondary storage can consist of -
- hard disks (internal, external, varying capacities from 1 gigabyte to 100 gigbytes typically)
- zip disks (100 or 250 megabytes)
- superdisks (120 megabytes)
- burn to CD-R or CD-RW (650 - 800 megabytes)
- a large number of new storage devices such as USB key rings, flash RAM cards, PCMCIA cards etc of widely varying capacity.

Sound is stored as computer files. There are a large range of sound file formats. The significant difference between each sound file format is the method of COMPRESSION used to reduce the sound file size. However, differing compression methods result in differing sound qualities when decompressed and listened to.

(c) 4 marks (3 x 1mk for the three methods + 1mk for extra effort in answer)

Sound File Compression (in detail)

There are several ways that sound is compressed so the final file size is as small as possible yet still exhibits adequate quality when it is decompressed for use (listening/editing)

The techniques are most frequently lossy. That is, some of the information is lost and cannot be recovered. A mathematical algorithm is used to prepare and compress the sound file for storage. Another related algorithm is used to decompress the sound file into RAM so it can be listened to/edited.

Methods of Coding Audio Compression:

1. Minimal Hearing Threshold

The human ear can only receive sound between 20 Hz and 20 kHz. Any sound not within this range is discarded as the information is of no use.

2. Masking Effect

When you hear sounds the louder, more prominent sounds mask the quieter sounds. In terms of compressing the sound we can remove the quieter sounds that we can cannot distinguish from the louder sounds.

3. Managing sound redundancy

Where a sound occurs simultaneously on both channels, it is recorded once for both channels to use, rather than recorded separately.

(d) **4 marks** **(3 x 1mk for the three methods + 1mk for extra effort in answer)**

Other ways to reduce sound file size.

The three settings when sampling sound can greatly affect the final size of the sound file **before compression**.

An Example...

For music CDs, analog sound is sampled at 44,000 times per second, 16 bits used to store each value, and there are two music tracks - stereo. This binary data is then stored on the music CD (max 74 minutes of music).

1. Sampling Rate

Sampling Rate	Best uses
11 kHz	Recommended for speech and short segments of music
22 kHz	Improved music playback
32 kHz	Broadcast audio standard
44 kHz	CD-quality audio playback
48 kHz	Digital audio tape (DAT) playback

Choosing the lowest sampling rate for the quality desired greatly reduces the file size. By sampling at 22 kHz rather than 44 kHz (ie 22,000 times per second), only half the data is collected so the file is HALF THE ORIGINAL SIZE

File size changes in direct proportion to the change in sampling rate.

2. Stereo/Mono

Stereo – two music tracks (left and right channel) each being sampled independently.

Mono – one music track

Thus, **stereo sound files are twice the size of mono sound files.**

3. Sample size.

The choice is 16 bits or 8 bits per sample. Quality is better for 16 bit, but depending on the use of the sound file, 8 bit sampling is OK. Twice as much data is collected and stored for 16 bit.

Thus, **16 bit sound files are twice the size of 8 bit sound files.**

By mixing the combination of these three factors and considering the quality of sound needed, a smaller usable sound file can be created before compression is used.

(e) 2 marks (4 x 1/2mk for any of four points)

Copyright and multimedia presentations

By its nature, multimedia presentations use a wide range of media. Our society has been exposed to these types of media for "a long time" (caveman wall painting days??), and the result is that various people want to maintain ownership of some of this media we have been exposed to. In many cases, a significant amount of money and time and effort has been spent of creating, marketing and distributing this media. These people (as you would imagine - and when you think about it - they should be entitled to) would like to control its use and maybe even try to get some money back to offset their initial efforts. Copyright is the legal aspect of people owning and controlling this media. You must get permission from these people (the copyright holder) and maybe pay some money, in order for you to use their media.

When creating a MM presentation, it is incredibly easy to obtain and use someone elses media. They are all so easy to get and use! Music on CDs, movies on videotape, graphics from the internet or scanned from magazines/catalogues/etc, sounds from computer games, text copied and pasted from CD encyclopaedias/internet or OCRed (optical character recognition) from books and magazines - most or all of these media subject to copyright!

If we (as multimedia creators) continue to use other's material there are three possible outcomes that I can see...

1. People will stop creating media - won't life become "boring" without music, movies, books, cartoons, the Simpsons, etc etc.
2. Technology will come up with the most convoluted, complex, hard to use, pain in the @#* methods to stop us from copying media, that it probably won't be worth our effort to legally use the media. (For example... you legally buy a DVD in the US, come back to Australia but can't watch it in your DVD player because of the different encoded zones the globe is divided into for DVD "security/copyright".)
3. The courts will lock you away for 50 years for the 2 seconds of Craig David "music" you put into your school multimedia presentation for the HSC Assessment task which you only got 20/100 for anyway.

So what do we do as multimedia creators to prevent this from happening?

There are two obvious answers...

1. We follow the copyright laws, respect others copyright of media, and request from the copyright holder permission to use their media in our presentations. This generally easy to do (if you can identify the copyright holder - although this still doesn't protect you if you can't find them) and they will frequently just say OK as long as you do blah... blah... blah... (which is usually easy and painless for us). Sometimes they will want (varying amounts of) payment, and occasionally others will SAY NO.
2. We create our own media (which of course becomes ours and we get to allow its use by others). This can be time-consuming and expensive and requiring considerable skills. Many professional Multimedia creation businesses do just this... they create their own media.

(By-the-way... my answer to this question you have just finished reading... it is © to me... so don't copy it or else!!!)

(f) **4 marks** **(8 x 1/2mk for any of eight points)**

Features of multimedia presentations for under 8 yo

There are a variety of features of 8 year olds that need to be kept in mind when designing multimedia presentations -

- The purpose of the presentation

  This needs to be identified first as the way you approach the final presentation and the features you build into it are determined by this answer. Is it leisure/entertainment, information, virtual reality/simulation, educational/training or combined such as educational games. (These are Syllabus areas).

  For 8yo kids, they would most likely be either entertainment or educational. The approach and use of each of the areas below is dependent on this purpose.

- Their attention span

  Little kids switch off faster and sooner than grown-ups (theoretically). They will not gradually switch off by going that little further to see if it gets more interesting... they will just drop everything and go and probably never come back - not successful. If the presentation is to be a success (otherwise, why spend all the time creating it) it must keep their interest and attention. They like and respond more to colours, animations and sounds/noises. They like positive reinforcement when the correct thing is done (or the wrong thing was done). All the points below are components in achieving this.

- Their reading skills and levels

  The amount and type of text that goes into the pages is very important. It needs to be large. They are not used to reading small font sizes (yet). The font type should not be boring, and it possibly should be coloured to liven it up a little. Space the text out, both vertically and horizontally... don't jamb it up and make it too hard to read. Don't put too much text on a page so they are overwhelmed and switch off because it is too hard to read and stay with the page. Don't use big words like "antidisestablishmentarianism" that they won't understand (supercalefragelisticexpealadoshis is probably OK). Keep the reading level at the correct age for the target audience.

- Their current interests

  Children these days are frequently "slaves" to marketing and entertainment. They are a major target audience for many TV shows and toys etc etc. If you can hang your presentation off these current interests for an under 8 yo, you should have more success.

  (Mind you, this depends on how one measures success. Do you want to consider the social and ethical issues of jumping on the bandwagon of the consumer society's exploitation of little, helpless children!?. In other words.... think about it, weigh up all the considerations, don't compromise your morals, ethics etc. THINK!!!)

- Navigation

  Little kids need different navigation around interactive MM presentations. As mentioned above, they need colour and graphics to help with navigation. Use less text for links and more graphics - or better still combine the appropriate word with the graphic as a hidden learning/association outcome. Hypertext can be reduced so there is less onus on text. Sound attached to navigation buttons helps. Constant little surprises in navigation encourage them to do just that... navigate around the presentation. They will investigate more thoroughly as a result - which is surely one of the main outcomes in a presentation for this age range.

Question 22

(a) Data Dictionary

Field	Data Type	Size	Purpose	Example
User	text	50	Name of user	Data Entry
Room	text	20	Room name	Editing
Type	text	50	Type of computer	Pentium III
PC ID	text	30	Identify the computer	IBM2
IP Address	text	15	Computer IP address	127.94.62.156
OS	text	10	Operating System	Win 95

(b) IP Address

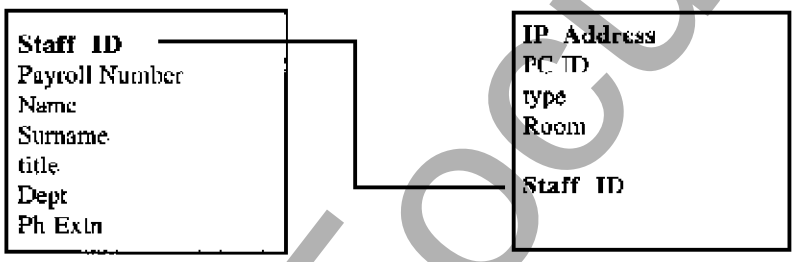
(c) (i) OS with the four OS types on it.

(ii) Mac OS
Win 95
Win 98
Linux

(iii) Prevents data entry errors.
Decreases data entry time as no need to type, just select and click
Forces consistency in data entry eg. MACOS / Mac OS.

(d)(i) Staff ID to be added, unique to each staff member **Or**
Payroll number would already be a unique staff identification code.

(ii)



(e)(i) IP address>= 127.94.80.0 **AND** IP address <= 127.94.80.50
or
AND(IP address>= 127.94.80.0 , IP address <= 127.94.80.50)

(ii) Social and ethical issues.
Technicians are not all "hackers" who are desperate to get into the information in a university database.
Issues include:

- security and how you will secure the database.
- assigning access to files on a needs to know basis. The different levels of access you will assign to the different groups of users including the technicians.
- accuracy and how you will ensure that the data obtained is accurate.
- protecting data by backing up.
- privacy - ensuring through your security, that personal data is kept private. Having policies that those with access to private information agree not to divulge any of the data they are privy to (including technicians)
- data mining - the raw data could be examined to find trends. It could be the changing socio-economic group of enrolled students.

Question 26

Social and Ethical Issues:

These social and ethical issues were mentioned in the question and would have had to be addressed

Nature of work

- change in individuals day to day work

- implications of the changes with respect to
  - work
  - health
  - lifestyle

- contrasts
  - how the tasks were done previously
  - how they are done today

- advantages/disadvantages to the individual
  - deskilling
  - retraining

Many of you answered the changing nature of an industry such as banking and how the community as a whole has been and is being affected but **not** how it impacts on the work of the employees and those associated with the industry.

Many others worked through the list of suggested occupations and describe how work used to be done and how it is done now. You did not address how those changes affected the individuals concerned and the implications of those changes.

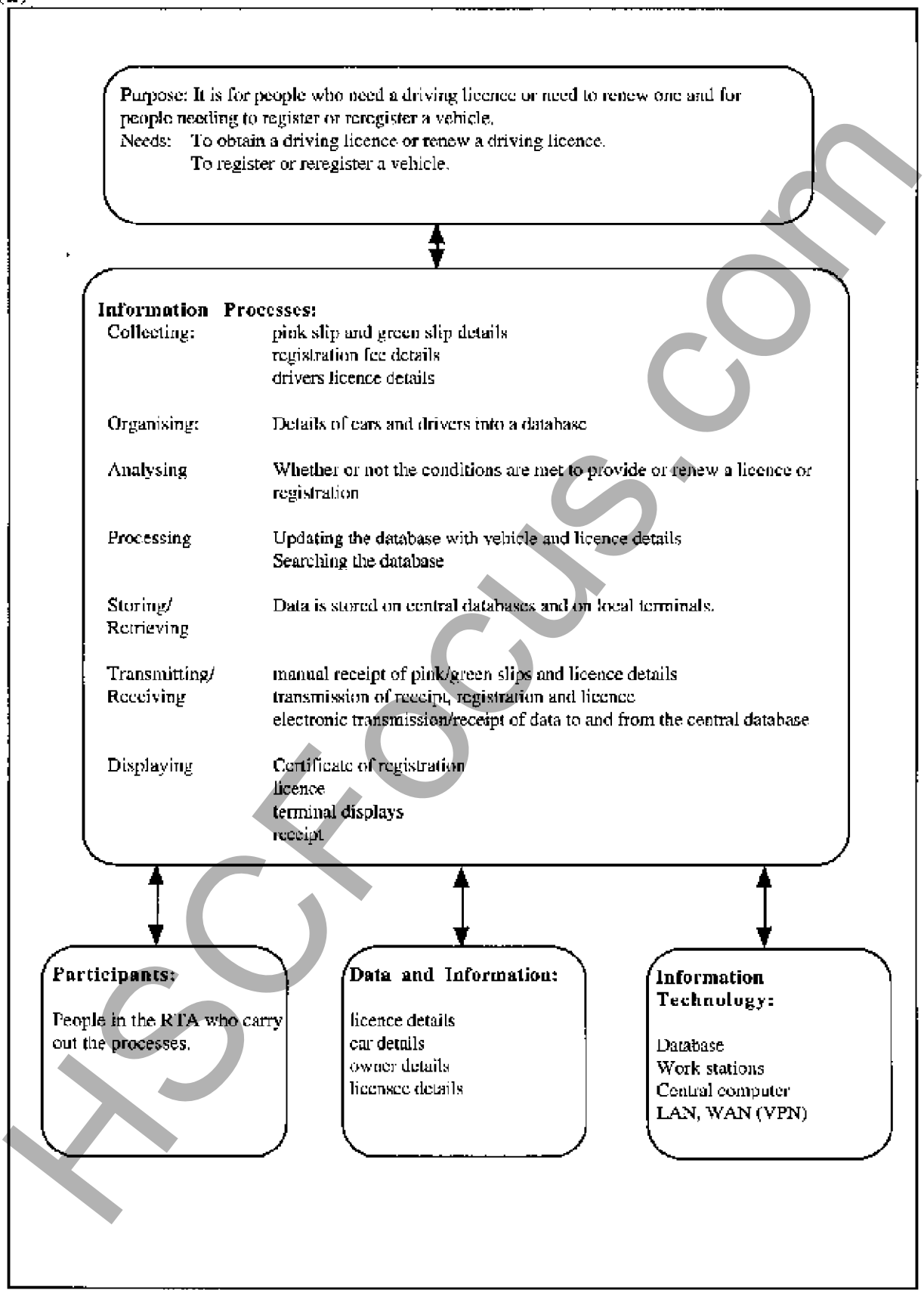
If you used the description "boring" explain why the task/job is boring. Many said the job of a petrol station attendant is more boring now. Why was the way the job was done previously interesting? Why is it more boring to work in an air conditioned environment using a complex computerised system?

When you described the change to internet banking, you described mainly the affects on customers and the implications of the change.

Some of you think that the job of a pilot has been deskilled to a point where the pilot has virtually no skill left, as everything in an aircraft is automated. Would you be prepared to fly in the planes piloted by these people if that were the case?

"Hackers" have nothing much to do with the changing nature of work and their job was not on the suggested list of occupations so they are best left out of your answers.

Question 24
(a)



(b)