Student Name:

HORNSBY GIRLS' HIGH SCHOOL

2016

# Information Processes & Technology

## Preliminary Course

YEARLY EXAM

Time allowed: 2 hours
(plus 5 minutes reading time)

**DIRECTIONS TO CANDIDATES**

**Multiple Choice (20 marks)**

- Attempt ALL questions
- Mark your answers on the Answer Sheet provided

**Question 21 (12 marks)**

- Answer the questions on separate writing paper

**Question 22 ( 12 marks)**

- Answer the questions on separate writing paper

**Question 23 (8 marks)**

- Answer the questions on separate writing paper

**Question 24 (8 marks)**

- Answer the questions on separate writing paper

| Section | Marks |
|---|---|
| Multiple Choice | /20 |
| Question 21 | /12 |
| Question 22 | /12 |
| Question 23 | /8 |
| Question 24 | /8 |
| Total | /60 |
| Total | % |

Information Processes and Technology Preliminary Course

# 2016
# YEARLY EXAM

**Student Name**:_____

## Questions 1 – 20. Multiple Choice Answer Sheet.

Circle the alternative A, B, C or D that corresponds to the best answer.

| Question | | | | |
|---|---|---|---|---|
| 1 | A | B | C | D |
| 2 | A | B | C | D |
| 3 | A | B | C | D |
| 4 | A | B | C | D |
| 5 | A | B | C | D |
| 6 | A | B | C | D |
| 7 | A | B | C | D |
| 8 | A | B | C | D |
| 9 | A | B | C | D |
| 10 | A | B | C | D |
| 11 | A | B | C | D |
| 12 | A | B | C | D |
| 13 | A | B | C | D |
| 14 | A | B | C | D |
| 15 | A | B | C | D |
| 16 | A | B | C | D |
| 17 | A | B | C | D |
| 18 | A | B | C | D |
| 19 | A | B | C | D |
| 20 | A | B | C | D |

**QUESTIONS 1 TO 20: MULTIPLE CHOICE [20 marks]**
**Attempt ALL questions. Each question is worth 1 mark**
**Select the alternative A, B, C or D that best answers the question.**
**Mark your answers on the Answer Sheet provided.**

**1.** Which of the following correctly categorises the hardware devices?

| | *Input* | *Storage* | *Output* |
|---|---|---|---|
| (A) | Keyboard | Hard drive | LCD display |
| (B) | Keyboard | Hard drive | Mouse |
| (C) | Mouse | LCD display | Hard drive |
| (D) | RFID tag | USB flash drive | Scanner |

**2.** Which of the following best describes *Processing*?
(A) Production of charts and graphs
(B) The changing of data to produce a different result
(C) Selection of an appropriate file type to allow the data to be used by a subsequent system
(D) Allowing data to be saved and subsequently re-loaded

**3.** Digital audio files are played by computers through analog speakers. Where does the conversion from digital to analog typically take place?
(A) CPU
(B) Sound card
(C) Amplifier
(D) Speaker

**4.** Which of the following groups of people initiate and /or carry out the information processes within an information system?
(A) Participants
(B) Direct users
(C) Indirect users
(D) Technicians

**5.** When the following list of data is sorted by relevant software into ascending sequence, the display is as shown.

| Original list | Sorted display |
|---|---|
| 421 | 13 |
| 13 | 2057 |
| 2057 | 421 |
| 8 | 53 |
| 53 | 8 |

What is the most likely reason for this?
(A) There is a fault in the logic of the sort (that is, the sort didn't work as expected)
(B) The data was sorted into descending rather than ascending sequence
(C) The data was sorted as text
(D) The data was sorted numerically

**6.** A nationwide Census was run in August by the Australian Bureau of Statistics, to collect a snapshot of all people in Australia on a given night. The majority of the population were expected to respond to the questions via a web-based form.

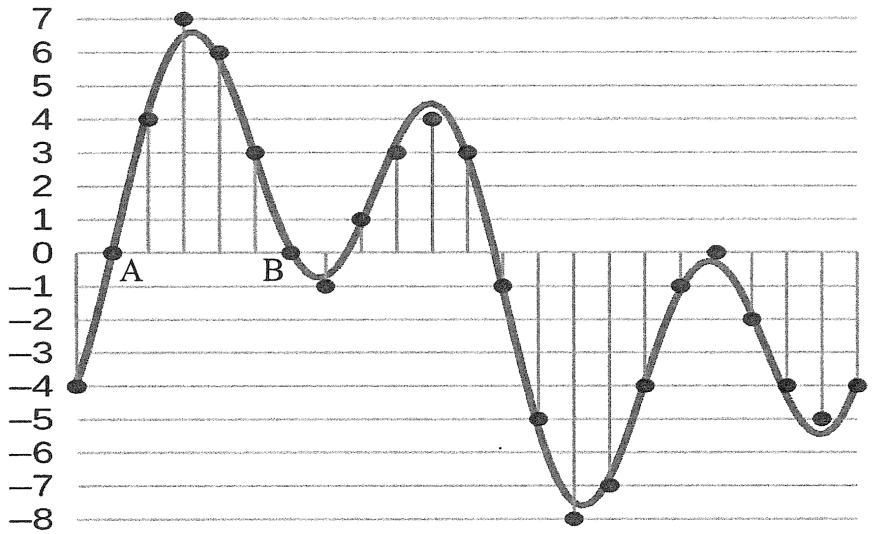
- Those unable to use a computer or smartphone connected to the internet could ring up a couple of weeks prior to organise for a paper form to be sent out to them, but many complained about unacceptably long delays for their call to get answered.
- The Australian Bureau of Statistics announced respondents' names and addresses would be kept with their responses for to 5 years.

Which of the following social and ethical issues are most closely associated with the dot points above?

(A) Quality of data and Speed of processing
(B) Nature of Work and Copyright
(C) Copyright and WH&S
(D) Privacy and Equity

Refer to the following information when answering questions 7, 8, 9 and 10.

A sound file is digitised by sampling the height of the analogue wave at regular intervals.




**7.** What are the correct labels for each of the two axes?

| | *Horizontal* | *Vertical* |
|---|---|---|
| (A) | Number of samples | Time |
| (B) | Number of bits | Number of samples |
| (C) | Time | Number of bits |
| (D) | Time | Amplitude |

**8.** A value of 8 is added to each data value and each data item is then represented in the file using 4-bits as the bit depth. What is the content of the generated digital file for the sound from point A to point B?

(A) 0, 4, 7, 6, 3, 0
(B) 1000, 1100, 1111, 1110, 1011, 1000
(C) 8, 12, 15, 14, 11, 8
(D) 0000, 0100, 0111, 0110, 0011, 0000

**9.** If the analogue wave is sampled 1000 times per second, approximately how much storage is required for a file containing one minute of digitised audio?

(A) 4kB
(B) 24kB
(C) 30kB
(D) 240kB

**10.** What would be the effect of increasing the bit depth when digitising this sound?

(A) It would decrease the file size and decrease the quality of the digitised sound
(B) It would speed up the process of digitising the analogue sound file
(C) It would increase the source of error when digitising the analogue sound file
(D) It would increase the file size and increase the quality of the digitised sound.

**11.** Which of the following best defines the environment of an information system?

(A) The aggregate of surrounding things, internal conditions, or influences on an information system
(B) Everything that influences an information system including its sources of inputs and its destination of outputs
(C) The surrounding conditions or forces that influence an information system's characteristics and ability to survive
(D) Everything that influences an information system, its operation and reason for existing

**12.** Which term is best described by the phrase "Data is organised and given meaning"?

(A) Data inputs
(B) Knowledge
(C) The results of a database query
(D) Information

**13.** Rainfall data is entered into a clearly labelled spreadsheet. The average rainfall for the period is calculated using a formula, and a line graph is created to show the daily rainfall.
Which information processes are described as occurring in this system?

(A) Collecting, organising, analysing and displaying
(B) Collecting, analysing, processing and displaying
(C) Organising, processing, saving and retrieving and displaying
(D) Analysing, processing, transmitting and receiving and organising

**14.** What is the major function of a microphone?

(A) Organising data
(B) Digitising data
(C) Collecting data
(D) Storing data

**15.** When considering the ergonomic processes for a new information system, which information processes is most likely to be carefully examined?

(A) Analysing and organising
(B) Collecting and displaying
(C) Displaying and storing and retrieving
(D) Organising and collecting

**16.** Which of the following delivery methods would most likely result in the highest quality display of a digital movie?

(A) A file embedded in a web page
(B) A movie streamed from a paid online movie service
(C) A movie stored on a CD-ROM
(D) A movie stored on a DVD

**17.** Data security is an important issue for information systems.
Which of the following is NOT a strategy commonly used to address this issue?

(A) Backup copies
(B) Logins and passwords
(C) Data validation
(D) Firewalls

**18.** Which of the following terms applies to all secondary storage devices?

(A) Volatile
(B) Non-volatile
(C) Random access
(D) Sequential access

**19.** Which of the following contains only display devices?

(A) Camera, microphone, scanner, pressure sensor
(B) Speaker, projector, web cam, printer
(C) Screen, printer, speaker, projector
(D) Graph tablet, printer, monitor, mouse

**20.** What is the name given to software that allows hardware to interface with the operating system?

(A) System properties
(B) System utilities
(C) Device driver
(D) Device manager

**QUESTION 21 [12 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

**a.** Explain how photographs are represented digitally as bitmaps. **3 marks**

**b.** Explain how a digital camera is able to collect colour image data. **3 marks**

**c.** Images can be stored as vectors or bitmaps. Explain the differences and provide example situations where each would be appropriate. **3 marks**

**d.** Video is essentially a sequence of bitmap images shown in quick succession. However, the storage required for a video file is far less than required to store each image separately. In addition, video often includes one or more audio tracks. Explain this storage size difference. **3 marks**

**QUESTION 22 [12 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

Below left is an image of an advertising kiosk which is situated in a shopping mall outside a supermarket. It aims to promote lamb by providing recipes to people.
In the centre is a horizontal scrolling section displaying images of a number of completed lamb dishes. Using touch, the potential customer can scroll through dishes and select one. They then push the red button in the centre of the display and a copy of the selected recipe is printed out and dispensed via the slot just below the red button for them to take home. An example is shown below right.




**Marrakesh Lamb Shanks**
Serves 4
Prep time: 10 mins
Cook time: 2 hrs
**Ingredients:**
8 lamb shanks
1 tbsp olive oil
2 tsp chopped chilli
2 tsk crushed garlic
1 tbsp ground cumin
1 tbsp ground coriander
1 tsp ground turmeric
¼ tsp ground cinnamon
425g can apricot halves
**Method:**
1. Heat the oil in a deep-sided pan and brown the lamb in batches. Remove and set aside.
2. Add the spices to the pan, stirring until well-blended with the pan juices. Stir in the stock and apricot juice.
3. Return lamb to the pot, cover and simmer till tender (1½ - 2 hours).
4. Serve on a bed of couscous

YOU NEVER LAMB ALONE
Weloveourlamb.com.au
for more recipes

**a.** Identify the users of this stand-alone information system. **2 marks**

**b.** Describe the data inputs and information outputs for this information system. **2 marks**

**c.** Discuss the information processes of collecting, analysing, retrieving and displaying for this information system. Identify the information technology used by each process as part of your answer.

**(i)** Collecting **2 marks**
**(ii)** Analysing **2 marks**
**(iii)** Retrieving **2 marks**
**(iv)** Displaying **2 marks**

**QUESTION 23 [8 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

*All parts of this question refer to the following information.*

Paperless Post

Paperless® POST

PaperlessPost is an online web-based application.

It allows a person organising an event to define their event by initially keying in a date and an event name. They can then customise their invitation from a range of standard templates as shown.




Once customised, the invitations can be sent electronically to a set of saved e-mail addresses. The application allows easy management of RSVPs. Guests can respond electronically with an optional included text message, and all RSVPs can be easily tracked.

At any time, the person organising the event can check the status of how many invitations have been responded to, and can see individual comments that respondents have included in their RSVP.

They can also update their guest list, and can choose from selected groups of guests (such as those who are coming, or those who have not yet replied) to be e-mailed if required with updated event information.

After the event is over, the event organiser can key in details of gifts that were received from their guests, and the system can automatically generate thank you messages that are sent via email, which include the guest name, details of their gift and a generic message to thank them for their lovely gift.

**a.** Explain the purpose of this PaperlessPost information system. **2 marks**

**b.** Describe what is involved in this PaperlessPost system in terms of the following information processes.

- Transmitting and receiving
- Storing and retrieving

**6 marks**

**QUESTION 24 [8 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

**a.** How does a laser printer produce an image? **3 marks**

**b.** What advantages do laser printers have over inkjet printers? **2 marks**

**c.** How does an LCD screen display an image? **3 marks**

**END OF PAPER**

# Answers for 2016 Yr11 IPT Yearly

Multiple Choice:

| | | | |
|---|---|---|---|
| Q1 - A | Q6 - D | Q11 - B | Q16 - B |
| Q2 - B | Q7 - D | Q12 - D | Q17 - C |
| Q3 - B | Q8 - B | Q13- B | Q18- B |
| Q4 - A | Q9 - C | Q14 - C | Q19 - C |
| Q5 - C | Q10 - D | Q15 - B | Q20 - C |

Q21(a) Photographs, or any image not constructed of definite shapes, are stored digitally as bitmaps, where a number of pixels are used to represent each pixel. The actual number of bits per pixel is defined by the bit-depth. The more bits, the more possible colours can be represented, as there is a greater number of unique combinations available to represent each colour.

Q21(b) On the rear internal wall of the camera is an array of CCD's, which measure the amount of light falling onto the back of the camera from the image. Each CCD responds to the amount of light that hits it, and generates a current equivalent to the amount of light. This current can then be converted to a combination of bits that will therefore represent the totality of the image once the information is collected from all of the CCD's. To allow the colour to be represented appropriately in the generated bitmap, a series of red, green and blue filters are overlayed in front of each CCD, so that each responds to the amount of light of the specific colour.
Because the human eye is more responsive to the colour green, there are approximately twice as many green sensors as there are blue or red, such as in the Bayer filter; a process of averaging is used to determine the resultant bitmap of the final image that more truly represents the colour of the original.

Q21(c) Bitmaps for black and white images consist of a bit to represents each pixel, 1 for black, 0 for white. If the image is coloured as discussed earlier, then each pixel is represented by a number of bits, with a unique combination representing each unique colour.

The problem is that for large block of pixels of a similar colour, each of the neighbouring pixels will be defined as being exactly the same (leading to redundant colour information and a much larger file size as there must be a set of bits for every pixel). Individual 'shapes' or objects within the image are also not differentiable for individual editing. However for detailed images, such as photographs, this is an excellent way of capturing all of the required detail in the image.

A vector image is one which consists of a combination of clearly defined objects, each of which is defined by a set of characteristics (such as the shape, its size, position on screen, fill colour, line colour, line thickness, etc…). This leads to a much smaller file size as only the objects and their properties need to be defined, and large gaps do not need to be defined as is the case with a bitmap. This also allows individual shapes to be selected and moved, grouped, resized without loss of resolution, brought forwards or backwards and so on. It is a trivial matter to change the colour of a line bordering a selected object , as only the property needs to be redefined, whereas in a bitmap, the user would have to enlarge the image sufficiently and laboriously click on each pixel to change its colour manually.

Therefore, for complex images with lots of individual detail and no obvious definable objects or patterns, a bitmap is preferable, even at the cost of a larger file size, whereas for ease of editing, significantly smaller file size and beautiful resizability (such as for a blocky logo), a vector is far preferred.

Q21(d) Essentially, a digitised video file consists of a series of still images that have been compressed using a lossy compression, otherwise the file would simply be too large to transmit or store, and its use would not be viable.

Commonly there are only small changes present in each subsequent image within a video sequence. Video codecs make use of this by only storing the differences between images rather than the entire image. This significantly reduces the file size. Key frames which include complete images are used at regular intervals with the intervening frames represented as the difference between the current image and the most recent key frame.

There are a variety of Codec's (or methods of compression / decompression) that can be used, and each produces its own specific video file type such as AVI, MP4, DivX, SWF, FLV……Each has its own special characteristics (such as which platform and software application is it compatible with, how fast will it decompress when being displayed, the relative compression ratio that it can achieve).

Q22 (a) The users of this system are the customers who read the information, choose a dish and print out a recipe.

(b) The data inputs are the selection of the dish using the scrolling touch screen and the request for a recipe by pushing the red button. The information outputs are the dishes displayed on the scrolling screen, the text displays on the large screen (advertising and instructions) and the recipe printed out on paper

(c)(i) Collecting – selecting and entering the required recipe by using the scrolling touch screen, requesting a printout using the red button, performed by the user at the kiosk.
New recipes can also be entered at head office by an authorised administrator person who can enter the required details for a new meal including text description, image and recipe via a keyboard and digital camera or scanner.

(ii) Analysing – the system determines which recipe has been requested, and searches its database to select the corresponding recipe to print out.

(iii) Retrieving – the search facility looks up the relevant record in its database by scrolling sequentially through all stored meal records and displaying the description and image one at a time, only stopping when a particular meal is selected, or there are no more to browse. When a particular meal is selected the recipe data from that record is retrieved for subsequent printing.
Storing would occur when the database is updated with new meal records, presumably entered by the administrator of the system.

(iv) Displaying – information is displayed on the LCD or Plasma screen (soft copy) and on the printout (hard copy)

Q23 (a) The purpose of this system is to efficiently and effectively manage the storage of event details and the associated guests, responses (RSVP's) and gifts, offering ease of communication between the event organiser and the guests at every step.

(b) Transmitting and receiving is an integral part of this system. Initially, the event organiser will log onto the system using a browser to locate the relevant pages stored on the PaperlessPost web server, which are sent to the device using the HTTP protocol. (Although not discussed in the question, it is assumed that the event organiser will have previously created an account, and so will need to first login by entering their username and password which will be securely sent to the PaperlessPost server to be compared with the stored file of usernames and passwords. A message will be generated by the software to be transmitted back to the event organiser, indicating if their login has been successful.)

The organiser of the event enters the details of their event and their guest list through a web-based form using the input available on their own device (keyboard, real or virtual), or by selecting a file of guests to read in, and this data is transmitted via their router (or mobile phone system) via the Internet to the server to be saved securely.
A confirmation message will be transmitted by the software via the router and the Internet to the sender of the data, and received to indicate that the information has been received and stored as expected.

The organiser customises their invitation by selecting choices from a menu – these details are transmitted to the server for storage, via their router and the Internet. The display of the customised invitation which incorporates each of the selected features is transmitted back to the sending device which receives it prior to displaying.
When the organiser is ready, they select a function from the menu to send the personalised invitations to each of the e-mail addresses in their guest list. This request is sent to the server, which is then interpreted by the software using a mail-merge feature to generate a personalised e-mail for each guest on the list to be sent to the e-mail address specified in their guest record, that is sent via the router to the mail server of each guest for download when they next logon.

On receipt of their invitation, guests click on the link in their invitation and when the information is sent to the PaperlessPost web server, the relevant page is retrieved and sent back to them for display on their device.
They can then click on the relevant button to say Accept or Regret and optionally enter a text comment; this information is sent back to the PaperlessPost server for storage within their updated guest record.
At any stage, the organiser can retrieve the information by transmitting appropriate data (entered from a displayed menu on their displayed web page) to request from the PaperlessPost system to retrieve the relevant data from the guest records and transmit it to the organiser's device, allowing them to see an appropriately formatted summary of how many guests have accepted or not, together with their typed comments.

After the event is over, the organiser can again logon to the system (as above), and enter the event details, which will be transmitted to the PaperlessPost system and the relevant web page sent back for display indicating they are authorised or not to view and edit the data. Once the organiser selects Enter Gift from the menu, they will be asked to enter the name of the guest and the gift. This data will be sent to the PaperlessPost system, and the relevant guest record retrieved from the server for display and confirmation, and then that record will be updated to store the gift information, and a confirmation message sent back to the sender.

Q23 (b) (cont)

Finally, in a similar manner the organiser can again login, select their event, and select Send Thank You's from the menu. All of the guest records for the entered event will be retrieved from the server and checked to see if they contain a Gift. If so, a mail merge feature will be used to generate a personalised Thank You message which will be transmitted to the e-mail address specified in that guest record, that is sent to the mail server of each guest for download when they next logon.

Q24(a)

- When a document is sent to the printer, a laser beam "draws" the document on a selenium-coated drum using electrical charges.
- After the drum is charged, it is rolled in toner, a dry powder type of ink.
- The toner adheres to the charged image on the drum.
- The toner is transferred onto a piece of paper and fused to the paper with heat and pressure.
- After the document is printed, the electrical charge is removed from the drum and the excess toner is collected.
- Most laser printers print only in monochrome. A color laser printer is up to 10 times more expensive than a monochrome laser printer.

(b) Even though the initial cost of a laser printer is higher than an inkjet printer, the difference in cost per copy quickly makes up the difference for a high-volume user. Laser printers also produce waterproof output. Laser printers have more efficient use of toner, faster print speeds and excellent print quality.

(c)

- In an LCD screen there is a backlight that shines out towards the viewer. In front of this are millions of pixels and each of these have a polarizing filter behind it and another in front of it that is rotated 90 degrees which makes the pixel appear to be dark.
- Between these two filters there are nematic liquid crystals which can be turned on or off. When these crystals are switched on it rotates the light 90 degrees which makes the pixels appear to be bright.
- Each pixel is controlled by a separate transistor

How pixels are switched off

1. Light travels from the back of the TV toward the front from a large bright light.
2. A horizontal polarizing filter in front of the light blocks out all light waves except those vibrating horizontally.
3. Only light waves vibrating horizontally can get through.
4. A transistor switches off this pixel by switching *on* the electricity flowing through its liquid crystal. That makes the crystal straighten out (so it's completely untwisted), and the light travels straight through it unchanged.
5. Light waves emerge from the liquid crystal still vibrating horizontally.
6. A vertical polarizing filter in front of the liquid crystal blocks out all light waves except those vibrating vertically. The horizontally vibrating light that travelled through the liquid crystal cannot get through the vertical filter.
7. No light reaches the screen at this point. In other words, this pixel is dark.

How pixels are switched on

1. The bright light at the back of the screen shines as before.
2. The horizontal polarizing filter in front of the light blocks out all light waves except those vibrating horizontally.
3. Only light waves vibrating horizontally can get through.
4. A transistor switches on this pixel by switching *off* the electricity flowing through its liquid crystal. That makes the crystal twist. The twisted crystal rotates light waves by 90° as they travel through it.
5. Light waves that entered the liquid crystal vibrating horizontally emerge from it vibrating vertically.
6. The vertical polarizing filter in front of the liquid crystal blocks out all light waves except those vibrating vertically. The vertically vibrating light that emerged from the liquid crystal can now get through the vertical filter.
7. The pixel is lit up. A red, blue, or green filter gives the pixel its color.