Student Name:

HORNSBY GIRLS' HIGH SCHOOL

2020

# Information Processes & Technology

## Preliminary Course

YEARLY EXAM

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

**DIRECTIONS TO CANDIDATES**

**Multiple Choice (15 marks)**

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

**Question 21 (7 marks)**

- Answer the questions on separate writing paper

**Question 22 (13 marks)**

- Answer the questions on separate writing paper

**Question 23 (16 marks)**

- Answer the questions on separate writing paper

**Question 24 (18 marks)**

- Answer the questions on separate writing paper

| Section | Marks |
|---|---|
| Multiple Choice | **/15** |
| Question 21 | **/7** |
| Question 22 | **/13** |
| Question 23 | **/16** |
| Question 24 | **/18** |
| **Total** | **/69** |
| **Total Pcent** | **%** |

Information Processes and Technology Preliminary Course

# 2020
# YEARLY EXAM

**Student Name**:_____

## Questions 1 – 15. 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 |

**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 these 2 pairs of the 7 processes convert data into useful information?
- (A) Collecting, Displaying
- (B) Storing and Retrieving, Transmitting and receiving
- (C) Analysing, Displaying
- (D) Organising, Processing

**2.** The main reason for digitising data for use on a computer system is which of the following:
- (A) It is easier for humans to process in this format
- (B) It is more secure to transmit data digitally than using analogue
- (C) It is easier for a computer to store and process digital data
- (D) It is faster to store and transmit data stored in digital format

**3.** What is the main purpose of the Copyright law?
- (A) To protect the rights of the author who created the work
- (B) To allow payment to the person making use of the work
- (C) To allow people carrying out plagiarism to be caught
- (D) To make the job of digital designers easier

**4.** What is NOT an issue specifically associated with the design and use of a global system?
- (A) equity
- (B) local taxation laws
- (C) network issues
- (D) validation

**5.** There are 7 processes involved in the use of an Information System. Which of the following are NOT associated with the process of Analysing?
- (A) searching and sorting
- (B) charts and graphs
- (C) what-if scenarios
- (D) editing and manipulating data

**6.** Which issue is most affected by Bias?
- (A) Copyright
- (B) Equity
- (C) Nature of Work
- (D) Accuracy

**7.** Which of the 7 processes is the one most likely to cause RSI or OOS?
- (A) Collecting
- (B) Organising
- (C) Analysing
- (D) Storing and Retrieving

**8.** Which of the following best describes the purpose of a browser?
- (A) Software to allow connection to the Internet allowing users to locate, retrieve and view sites.
- (B) Software to retrieve pages from webservers connected to the Internet.
- (C) Software with a graphical user interface to locate and format stored HTML files.
- (D) Software that scans the World Wide Web to locate stored pages.

**9.** What is the main purpose of Netiquette?

(A) To allow moderators to effectively manage discussions to prevent the display of abusive language.
(B) To guide people as to how to behave appropriately when conducting conversations online.
(C) To ensure that data transmitted over the Internet can be sent efficiently.
(D) To ensure that data transmitted over the Internet can be sent and stored securely.

**10.** What is the main advantage of using a mail merge?

(A) It is faster to transmit large documents over a communications network
(B) Allows for a number of automatically personalised documents to be prepared using selected data from a date
(C) Allows for a database to store and access required records using a DBMS through the use of SQL queries
(D) It allows for secure transmission of e-mail communications between authorised users over a network

**11.** Which of the following correctly identifies the properties of the type of data storage?

(A) ROM is non-volatile data storage and secondary memory
(B) RAM is volatile data storage and primary memory
(C) Flash is non-volatile data storage with sequential access
(D) CD-Roms are volatile data storage with direct access

**12.** How is audio digitised?

(A) By sampling the sound many times a second
(B) By representing the sounds as ASCII codes
(C) By sampling the sound and then quantizing the measurements
(D) By representing the properties of the sound as a series of equations

**13.** A new device is under development. It scans printed pages and then reads them out loud. What technology would be needed to perform this task?

(A) Scanner, sound card, speakers
(B) Scanner, sound card, speakers, OCR software, speech recognition software
(C) Scanner, sound card, speakers, OCR software, speech synthesis software
(D) OCR software and speech synthesis software

**14.** Which device converts digital signals to analogue prior to transmission?

(A) router
(B) system bus
(C) network interface card
(D) modem

**15.** A company logo can be enlarged to any size without reduction in quality. Which type of software was likely used to product this logo?

(A) Bitmap software
(B) Desktop publishing software
(C) Draw software
(D) Paint software

**QUESTION 21 [7 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

(a) Explain how data is transmitted between components on the motherboard. **2 marks**

(b) Distinguish between word processing and desktop publishing software applications. **2 marks**

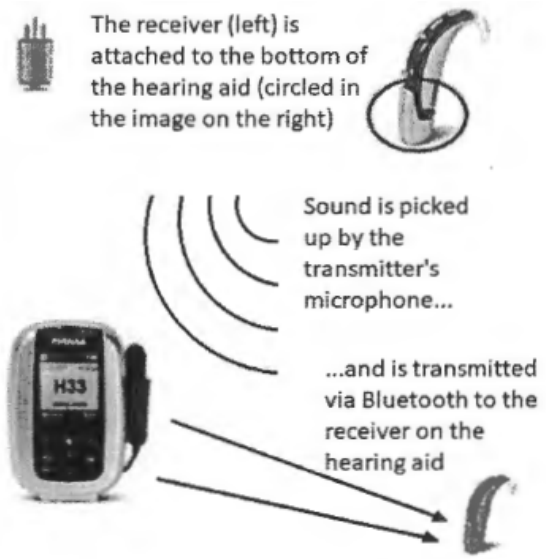
(c) Explain how a flatbed scanner digitises images. **3 marks**

**QUESTION 22 [13 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

All parts of this question refer to the following information.

Peter is a year 9 student at Mustgow High School. He has a hearing problem and uses an assistive listening device. At the beginning of class, Peter hands his teacher a transmitter unit with a microphone that is worn around the neck during class. This microphone collects the teacher's speech and uses Bluetooth to wirelessly transmit the digitised sound to the receiver that is part of Peter's hearing aid, enabling Peter to clearly hear everything that is said.






(a) The teacher's speech is analog data, and this is converted to digital data for transmission from the transmitter to the receiver.

i) Distinguish between analog data and digital data **2 marks**

ii) Explain how the audio data is digitised by the microphone and transmitter unit. **3 marks**

(b)

i) Outline the characteristics of Bluetooth. **3 marks**

ii) Identify TWO other methods of wireless data transmission. **2 marks**

(c) Discuss issues related to the classroom use of this device to assist Peter hear what his teacher is saying. **3 marks**

**QUESTION 23 [16 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

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

As part of a science assessment project, John had to collect and display information about the elements of the periodic table. He decided to find the name, atomic number, symbol and atomic weight for each element. He also decided to include a field that indicated whether the element was a gas, liquid or solid at room temperature and to display an image relevant to each element.

(a) John began collecting the data using a spreadsheet.
   i) Explain how data is *organised* in a spreadsheet. **2 marks**

   ii) Outline advantages and disadvantages of using a spreadsheet to collect data for this project. **3 marks**

(b) Once John better understands the problem, he decides on a database solution along with a data entry form and summary report using a table format.
   i) Describe advantages of using a database solution over a spreadsheet solution for this project. **3 marks**

   ii) Recommend a file type that John should use for the image used for each element and give a reason in support of your recommendation. **2 marks**

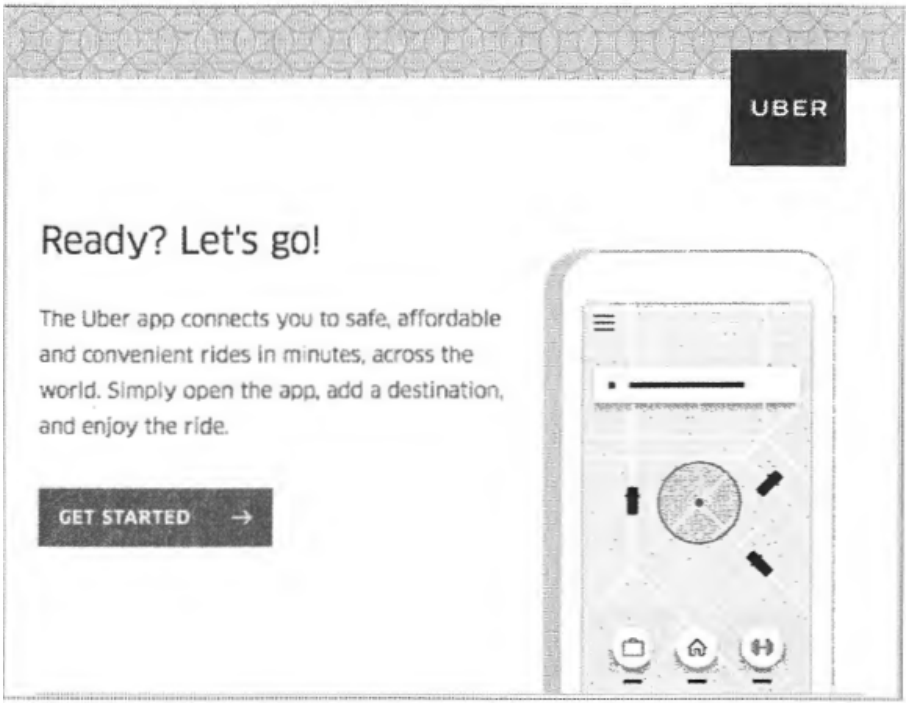
(c) Explain how John could set up data entry for the field that stores whether the element is a gas, liquid or solid at room temperature. **3 marks**

(d) The periodic table is arranged in ascending atomic number order. Outline the information processing occurring to print a report of all the data from the database in ascending atomic number order. **3 marks**

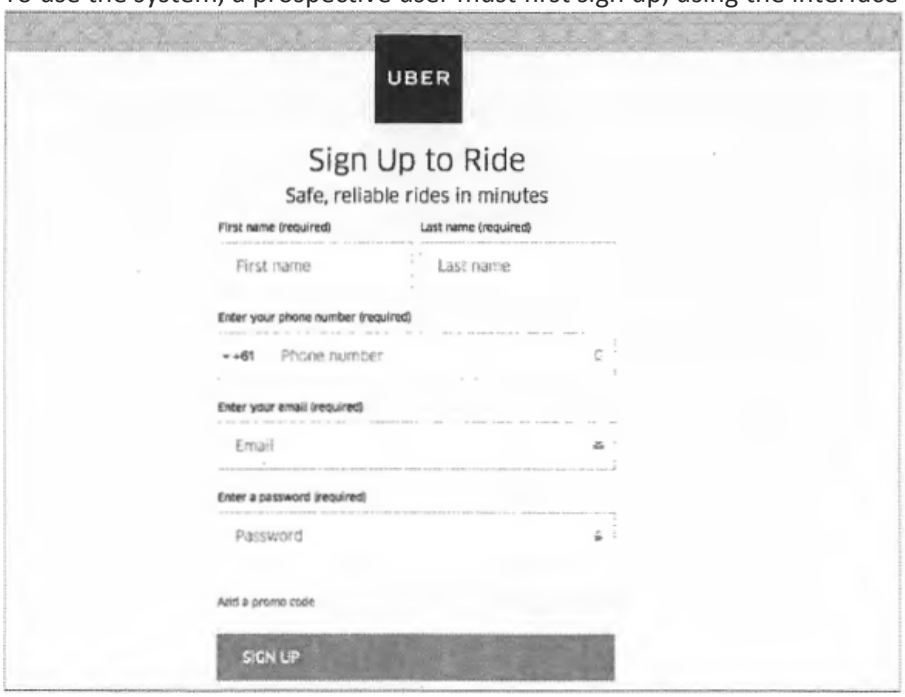
**QUESTION 24 [18 marks]**
**ANSWER on separate writing paper, clearly marking question number and part numbers.**

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

**UBER** is an increasingly popular application for organising transport.




To use the system, a prospective user must first sign up, using the interface as shown:




Question 24 continues on the next page

**Question 24 - continued**

(a) On the above interfaces, identify an example of **2 marks**

- an image,
- a hyperlink,
- a prompt, and
- a text box.

(b) Evaluate the design of these two interfaces. **3 marks**

(c) Describe how the data entered into each of the required fields can be validated. **3 marks**

(d) Other data required by the system when signing up includes credit card details, home and work address.
To book a ride, a user can use their mobile phone to enter their destination and change the pickup location from the current location if required. The system will show the stored home and work locations allowing easy selection of these common destinations from a drop-down list. Otherwise, another address can be entered by the user.
As a nearby driver opts to take the booking, the user can see the cost for the trip, the estimated time for arrival and the current location of that driver as a moving small car icon on a local map as it nears the pickup point.
Once the passenger has been picked up and safely delivered, the cost of the trip is automatically credited to the passenger's bank account, and an e-mail is sent to the passenger as shown on the following interface.




i) Construct a context diagram for the described UBER booking system. **3 marks**

ii) Describe using specific examples what makes this UBER system human-centred. **3 marks**

iii) Describe the social and ethical issues associated with the use of the complete UBER system as described. **4 marks**

2020

# Information Processes & Technology

**Preliminary Course**

YEARLY EXAM

Answers

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | C | A | D | D | D | A | C | B | B | B | A | C | D | C |

# Question 21

(a)
The motherboard connects components, such as the CPU and RAM, via parallel wires called bus lines. The word size of the system determines the number of connections in each bus - a 64bit system has 64 parallel connections in its bus lines. Data moves in units based on the word size, so in a 64bit system, 64 bits move from one component to the other along 64 distinct parallel connections. The data is transmitted synchronously in time with the system clock.

(b)
Word processing software is used for working with mainly text, while desktop publishing software involves production of documents that combine text with graphics. A word processor concentrates on text editing features rather than formatting precision.

Desktop publishing software allows users to work with more complicated and precise page layouts than a word processing application. DTP software is perfect i for making flyers, brochures, booklets. This type of software offers more advanced formatting features than word processing applications, and with greater ease of moving the graphics and text around the page. The output from a desktop publishing application is suited to professional printing.

A good example of a word processing application is Microsoft Word. a desktop publishing application - Adobe Indesign. and QuarkExpress.

Ref: https://www.quora.com/What-is-the-difference-between-word-p rocessing-software-and-desktop-publishing software

(c)

In the case of a flatbed scanner, the document is placed against the top glass surface of the scanner and the lid is closed over the document to prevent light from entering the device. The transparent glass keeps the document in place while allowing the sensors to detect document details. As in a camera, the dark conditions allow the scanner to control the amount of light reflected on the document surface.

**Mechanics**

Once the document is in place and the lid is closed, a moving belt slides a light source across the entire surface of the document. The motor in a scanner is finely tuned to make sure this light source travels at the same speed and creates the same amount of light across the whole document, ensuring a uniform exposure. The light shined on the document then reflects back into the machine and is reflected onto the lens by a series of mirrors.

**Optics**

Much like a digital camera lens, a scanner lens includes a photosensitive element that detects differences in reflected light as different shades of colour. Most scanners use an electronic light-sensitive circuit known as a charged couple device, although some high and low end scanners use different technologies like photomultiplier tubes or contact image

# Question 22

(a) i

Analog data is real world data which can take any value across the viable range, while digital data is the data used by computers and other digital devices which signify discrete values. Digital data is composed of discrete signals (or voltages) which can only denote the values of O or 1, and different combinations of these signals are used to denote specific values. Analog data must be digitised to convert to digital data before it can be stored in and used by computers.

(a) ii

Microphones are essentially analog devices. They include a diaphragm that vibrates in unison with the analog compression sound waves . As the diaphragm vibrates it physically moves a plate or coil to alter the current flow through the circuit. This varying current is an analog electrical version of the sound wave suited to digitisation.
The ADC circuitry in the transmitter takes measurements of the analog electrical signal from the microphone at regular intervals (called sampling). It records the height of the analog wave (amplitude) for each sample and represents it as a combination of bits. These measurements are made many times a second and this is called the sample rate. The size of each sample (the number of bits used to represent each of these samples) is called the sample size. The quality of the digitised sound improves as the sample rate and sample size increase as more of the detail of the sound wave is able to be captured (represented digitally), but the audio file size will also increase accordingly.

(b) i

Bluetooth is a short-range communication technology used to connect devices using short-range radio frequency which replaces hard-wired communication. This technology is globally accepted, and any devices which are Bluetooth enabled can communicate with other Bluetooth-enabled devices located in proximity to one another once they are

paired. When a group of two or more Bluetooth devices are sharing information together, they form a mini computer network called a piconet. The range is typically less than 10m up to 100m and it allows wireless communication between devices such as smartphones, gaming consoles, and wireless audio devices such as headphones, speakers, car audio systems.

(b) ii

Two other methods of wireless communication include

- Satellite
- Infra-red
- Broadcast radio
- Microwave wireless communication
- Wi-fi (currently the standard is 802.1 lac, capable of 1300 megabits per second (Mbps))

(c)

Relevant issues include:

- Data Accuracy: The hardware and software (including the communications link between the two devices) will need to function accurately to provide Peter with a clearly understandable audio signal. Ambient noise in the classroom may still make it hard for Peter to clearly hear the teachers voice clearly
- Privacy: The teacher may have to be careful when talking privately to other students in the class and may have to remember to turn the microphone off when not talking to Peter
- Nature of Work: The device improves Peter's access to learning and enables him to overcome disadvantages that hearing problems would likely create, without putting any extra stress onto the teacher
- Nature of Work: As Peter would be better able to hear what is happening in class he is likely to be less bored/badly behaved/disruptive. So the use of the assistive listening device would potentially improve classroom behaviour and the quality of learning for all of the students in the classroom, and it also takes the pressure of the teacher having to repeat content or speak more slowly and carefully
- Equity: If the cost of the cost of the ALD is significant, it may make it difficult or impossible for a student needing one to be able to afford to buy one.

# Question 23

(a) i

In a spreadsheet, data is organised in a tabular format

- Individual cells are arranged into columns and rows, and possibly in separate worksheets.
- Text labels can be used to identify for the user specific data stored in a group of cells, column or row or worksheet.
- Cells can be formatted to store and display data as different data types.
- Data stored in cells can be arranged into input, calculation and output areas
- Borders and colours can be used to distinguish between different areas on the worksheet

(a) ii

Advantages for using a spreadsheet to store and manipulate John's data may include:

- A spreadsheet is easy for John to use by putting each of his required fields in a different column, with one row for each element
- He can include a header row which contains appropriately formatted labels to identify each field
- The data can quickly be typed directly into the spreadsheet, or pasted (or imported) from other ethically available sources (such as other databases or websites).
- The spreadsheet can be easily formatted to look professional with good use of colour, borders and documentation
- The rows (= element data) are easily sorted by any column such as say, element name, or symbol, or atomic number, or state
- It is also relatively easy for John to use the filter feature to quickly select all gases, or all solids
- Potentially, he could easily produce graphs if required of, say, atomic number vs atomic weight

Disadvantages include:

- It is not a simple matter to search for a specific element (unless John uses the advanced filter feature, probably
- requiring him to create a macro to automate the process)
- The images are not easily stored in specific cells associated with each element row, so filtering will not include the image relevant to the element
- It is not a simple matter to define different report formats to display selected elements from John' s worksheet

(b) i

Using a database to store the elements includes the following advantages:

- It is a simple matter to search for a specific element by name, or with atomic weights within a given range, or to use complex searches that have multiple conditions
- The images are easily stored in a specific field associated with each element record, so any queries can also display the image relevant to the element
- It is a simple matter to define different well-designed report formats or forms to display selected elements from John's database

(b) ii

John could collect the images associated with the elements as JPEG files because these are compressed image files and provide a good quality image suitable for display for this purpose, without requiring a large amount of storage to store

(c)

John could create a drop-down list which includes the values 'solid' , 'liquid' and 'gas', allowing quick and easy selection of one of these for entry into the state field in the spreadsheet or in the database. This method of data entry offers automatic data validation by restricting values to only those on the list.

(d)

The steps include:

1. Select all records - which will read in each record from where they are stored in the data base on the hard drive
2. Sort the records (the software uses the ASCII values of each of the atomic numbers to determine the sequence, and re-orders the records for display in ascending order of ASCII value).
3. Determine which layout is associated with this ascending atomic number report, and the software then places the data from each of the newly ordered records into the defined positions according to this layout
4. The software interacts with the Operating System to transmit the data ready for display to the specified device

# Question 24

(a)

• Image-the picture of the phone screen, or the UBER logo
• Hyperlink - GET STARTED -> or SIGN UP buttons
• Prompt - Enter your Phone number (required) ( or similar for any of the fields to be entered into the second screen)
• Text box - any rectangle into which data can be entered (such a underneath the First name (required) prompt)

(b)

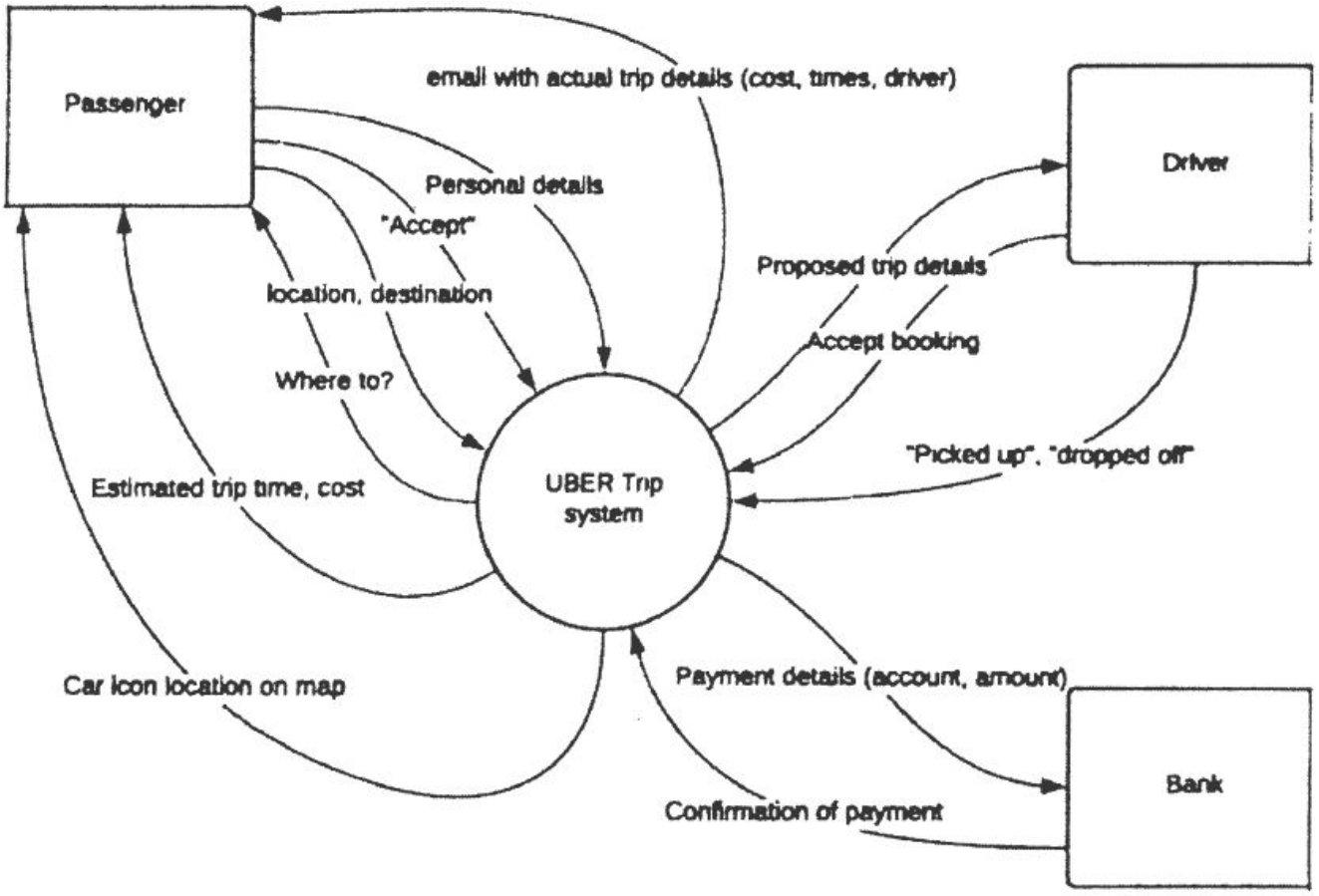
The following are all good design features used in the design of the 2 interfaces:

- Use of sans serif font (for ease of legibility)
- Good use of white space - the data on the screen is spread out to take up the whole screen, ad not bunched together
- The use of simple colour scheme
- Clear prompts (succinct but informative without being too wordy) with a greyed out reminder inside each associated text box
- Good use of the logo to identify each screen without distracting
- Clear heading on screen 2 (Sign Up to Ride) in a larger font to clearly identify the purpose of this particular interface
- Consistency of design between both screens so as to not confuse / frustrate the user

(c)First name - not possible to validate ( except possibly to specify that the first character should be a capital letter)

- Last name - not possible to validate ( except possibly to specify that the first character should be a capital letter)
- Phone number - should be digits only, no brackets or spaces (although this is not specified in the prompt)
- email - validation to ensure that there is a single@ in the text with only letters and numbers allowed and a legitimate domain following the @ symbol.
- password - validation could be used to require at least one upper case letter, one lower case letter, one digit, and one symbol, and a minimum length of, say, 10 characters or similar requirements to make the password more secure.
- promo code - only values from a current stored list

(d) i



(d) ii

A human-centred system is one which is easy and seamless to use with minimum involvement required, and with frustration minimised for the user. A human-centred system must also meet their needs well and supply the necessary functionality with minimum need to interact with the system.
This UBER system provides an initial sign up process that asks for minimal information, in a well-designed very easy to-use page. The prompts are clear and unambiguous, and the page is not cluttered with unnecessary distractions. Presumably there is automatic tabbing from the first name field to the surname field and then via the remaining fields down the page to the sign-up button. The sign-up button is obvious - well named, in a different colour, and in the appropriate position following the user's line of sight down the page.
When booking a trip, the user is presented with their home or work address as a default ( which was previously entered only once at initial sign-up and safely stored in their record on the UBER server. That means that it is an easy matter to retrieve and display that data and then use that retrieved data in the trip transaction). If either of these addresses are correct, it is a one click process to select it. Only if they require a different pick-up address does the passenger have to key any data in.
For the passenger waiting for the driver to arrive, they can watch the icon moving on the map towards their location, thus reducing frustration with previous systems where the person waiting to be picked up had no idea how far away their driver was, or even if a driver had accepted their job at all.
Payment is made as easy as possible. The passenger will have already provided their credit card details at sign-up time, (now securely stored with their records on the UBER server, and easily retrieved to send to the bank with the cost of the trip when the driver signals that they have successfully dropped off the passenger). This makes the process much quicker for the passenger on drop-off (no fumbling for cash or credit cards or having to wait for a receipt to be printed), and no need to even carry cash at all (which is safer for the passenger and the driver). There are no nasty surprises, as The passenger is already aware of the cost of the trip, which was sent to them as part of the initial booking process.

(d) iii

There are a significant number of social and ethical issues associated with the use of this system.
**Copyright** -presumably the Uber company owns the copyright to the logos and design of their interfaces, thus protecting their intellectual property. Presumably, they have also requested permission to use the (Google) map information that they use to display the car icon to the passenger (to represent the current position of the driver), and to
display the route to the driver to get to the destination.
**OH&S** - the driver is no longer required to handle money, process credit cards and print receipts, all of which is more difficult to do in the confines of a small vehicle. Hopefully, the smartphone on which they interact with the system to accept and manage their trips, and to see the route to take, is located in an appropriate position for them to access while
in the driver's seat. The interfaces for the passenger are well designed and easy to navigate, with all relevant information displayed in an easy-to read manner.
**Nature of Work** - both passengers and drivers should experience less frustration through the use of this system compared to the previous taxi system, which now requires much less input and no use of the previous frustrating phone call system
**Quality of data / Accuracy** - there is no need to capture audio data over the telephone as with the previous taxi system, so hopefully the digital data stored for addresses ( and entered via the virtual keyboard if not the standard home or work
address) will be more accurate.
**Privacy** - it is important that UBER do not share personal data about who travels where and when, as this information could be used by others for non-ethical purposes ( employers who realise their employees are not where they are supposed to be, thieves who see that residents are not at home, etc). Any data that is stored for management reporting purposes must be stripped of personal identifying information.
**Security** - because the system stores credit card information, it is important that there are appropriate procedures in place to protect this data from unauthorised access. Such processes could include encryption, use of firewalls, defined levels of access for different participants to minimise unauthorised access to this data.
**Equity** - although this system offers many benefits, it is restricted to users with a relevant smartphone who have the app installed, and who have sufficient coverage to guarantee a good signal ( and an appropriate data plan to allow transfer of
the data for display). Hopefully the system is available across all platforms and for all models of phone, and not just, say, for the latest iPhone users.