

B O A R D O F S T U D I E S
NEW SOUTH WALES

2012 HSC Information Processes and Technology 'Sample Answers'

When examination committees develop questions for the examination, they may write 'sample answers' or, in the case of some questions, 'answers could include'. The committees do this to ensure that the questions will effectively assess students' knowledge and skills.

This material is also provided to the Supervisor of Marking, to give some guidance about the nature and scope of the responses the committee expected students would produce. How sample answers are used at marking centres varies. Sample answers may be used extensively and even modified at the marking centre OR they may be considered only briefly at the beginning of marking. In a few cases, the sample answers may not be used at all at marking.

The Board publishes this information to assist in understanding how the marking guidelines were implemented.

The 'sample answers' or similar advice contained in this document are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee's 'working document', they may contain typographical errors, omissions, or only some of the possible correct answers.

Section II

Question 21 (a)

Answers could include:

Customer Code – text, Customer Name – text, Customer Address – text etc.

Any three fields with a suitable data type that would be included in the order table would be acceptable.

Question 21 (b)

Answers could include:

The customer would need to have things like: a computer, access to a modem, an ISP, cable/wireless to connect the computer to ISP, interface card, browser software, security software.


Question 21 (c)

Answers could include:

Developers could include: online help systems, bubble help, on-screen instructions, a training video, drop-down menus, voice help, provide a contact phone number to gain assistance from a person.

These features could all be used to help users in different ways depending on their needs. For example, voice help could greatly assist a user who experiences reading difficulties whereas on-screen instructions could assist a user in successfully completing a sequence of steps to place an order.

Question 21 (d)*Sample answer:*

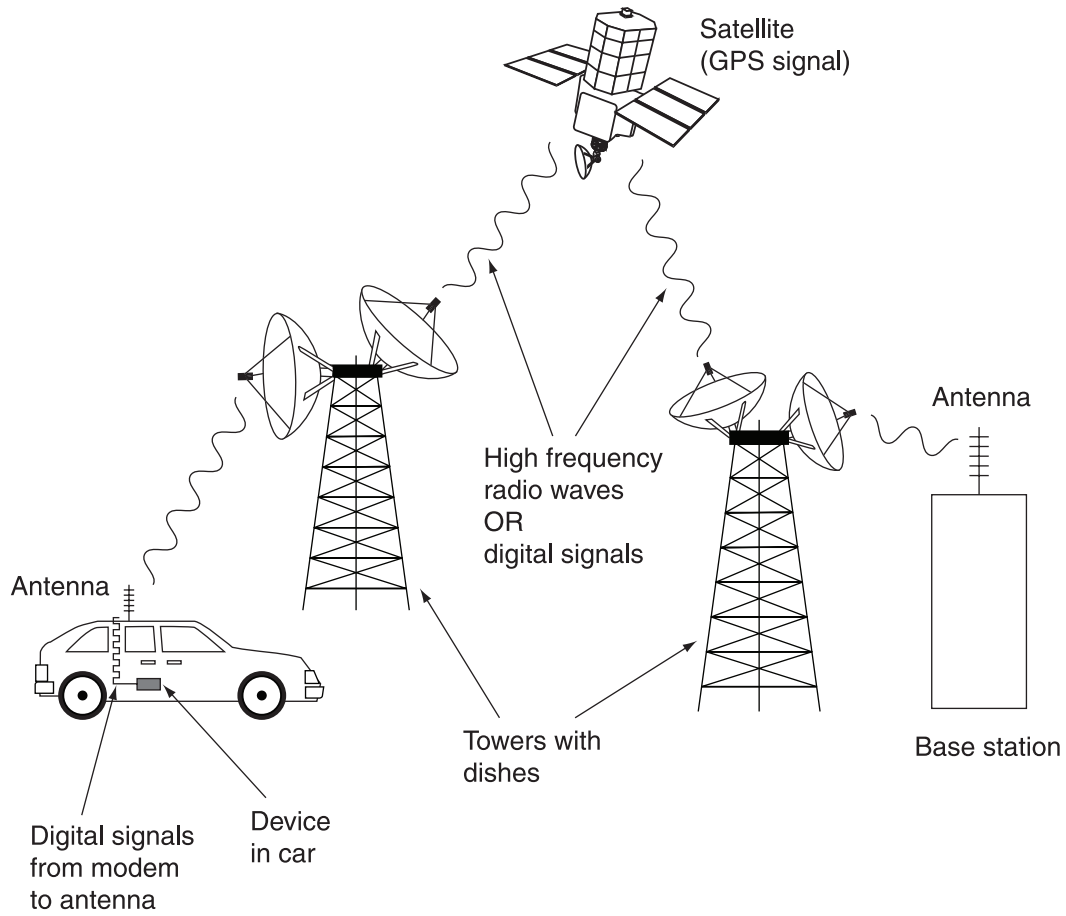
COMPANY NAME		
Customer Name	<input type="text"/>	
Customer Address	<input type="text"/>	
<input type="text"/>		
ORDER		
Book Code	Book Name	Price
<input type="text"/>	<input type="text"/>	<input type="text"/>
		Total <input type="text"/>
<input type="button" value="Print Invoice"/>	<input type="button" value="Print Address Label"/>	Order Complete <input checked="" type="radio"/> Back Order <input type="radio"/>

Justification may include:

- Employees who pack and dispatch book orders will need to confirm that the customer name and address match the order
- Can be used to confirm books in the order while it is packed
- They need to print an invoice to pack with the order
- They need to print an address label for the parcel
- They need to confirm that the order has been completed or back-ordered

Question 22 (a)

Sample answer:



Note: Answers without 'towers with dishes' are also acceptable.

Question 22 (b)***Sample answer:***

The most appropriate development approach would be using a traditional approach. It is a large scale project which would require a large team of developers working in teams. It would also be beneficial to create a prototype for testing and evaluation and then make changes as required.

The project, or parts of the project, may be outsourced to get professionals with technical knowledge to work on the project.

Question 22 (c)

Criteria	Marks
• Provides discussion indicating understanding of change in nature of work and context	2
• Identifies factors of nature of work	1

Sample answer:

Telephone operators will still need to answer phones for emergencies relating to car crashes but there will be no need to get locations and accident details before dispatching emergency vehicles. However, emergency telephone operators will need to undergo training to learn how to use the new computer system. The duties of emergency response workers will change from gathering information to analysis of given information and decisions relating to appropriate responses.

Question 22 (d)***Sample answer:***

The data collected by the crash sensor would be formed into data packets by converting the analogue data collected into its digital equivalent. Each data packet transmitted should include:

- special start and stop bits to indicate the start and end of each data packet
- an error detection method such as the use of an additional parity bit
- a rating to indicate the severity of the crash
- GPS coordinates indicating the location of the crash.

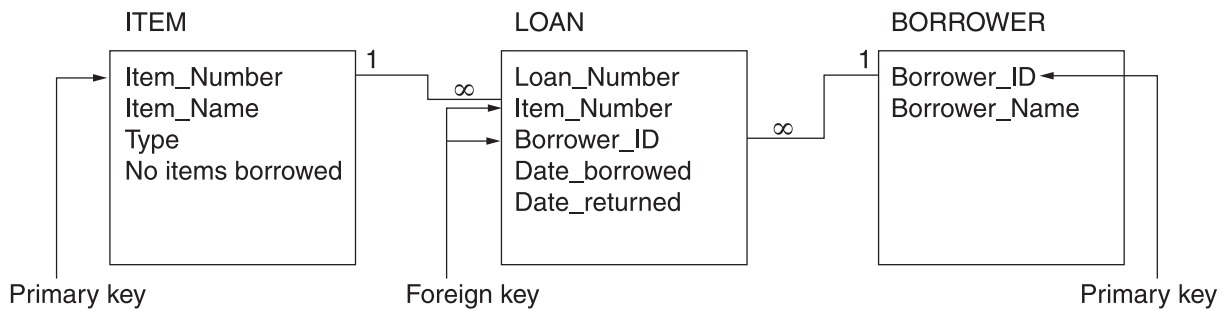
Question 23 (a)***Sample answer:***

The database structure used is a flat-file database. The borrower details should be separate from the item details so that the borrower name is not displayed when an item is searched for. Also, there are two fields relating to both Item and Borrower and the borrower's full name is displayed within one field. Normalising the database will solve this problem, separating borrower into first name and surname.

Other problems that can occur from using a flat-file structure in a database include data redundancy (unnecessary repetition of data); update anomalies (eg update a name in one place and not another); deletion anomalies (eg deleting an item may result in deleting a borrower); and insertion anomalies (eg to add an item you need to have a borrower — or empty fields).

Question 23 (b)

Sample answer:



Question 23 (c)

Sample answer:

The items can be stored in the warehouse in a dynamic sequence.

Using the 'No. of times borrowed' field to place the items in a location that makes it faster to access will continue to improve the efficiency of the retrieval system.


Using the Item number as a secondary item in the order sequence will enable all like items of similar size to be located in appropriate storage facilities.

Question 24 (a)

Sample answer:

Participants in the development of OSS are people who contribute to designing and writing software. These people are those that have the time and motivation to contribute, and who do not expect to be paid.

Question 24 (b)**Sample answer:**

Edit code	View	History	Chat
_____		Time Stamp	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● _____
_____		_____	● 
Version	<input type="text"/>		Local Time: <input type="text"/>

Note: Aspects of the screen design that should be included are:

- Area to view and edit source code
- A chat/video conference room
- Times in different zones, and different locations, identified for participants

Question 24 (c)**Answers could include:**

Discussion of:

- Compatibility of the OSS with hardware, existing software and existing data formats
- Updating OSS software when updates of h/w or o/s occur or when software is modified/updated
- Training of users of the OSS
- Training technical support staff
- Availability of documentation for OSS
- Depending on the quality of work by unidentified programmers
- Ongoing consideration of legal implications that arise if the software fails
- Procedures for dealing with security issues if they become evident

Section III

Question 25 (a) (i)

Sample answer:

An OLTP is a real-time computer-based system that records events that are important to an organisation.

Question 25 (a) (ii)

Sample answer:

Backup of student assignments submitted online is important to ensure the student's work is not lost if there is any system failure. If there is a system failure then the backup copy can be accessed to enable student assignments to be marked.

Question 25 (a) (iii)

Sample answer:

Batch processing allows processing to occur when a number of transactions have been accumulated. It does not require a computer to be dedicated to processing all the time, but only when the group/batch of transactions is processed.

Question 25 (b) (i)

Sample answer:

If the ERP is not available then a manual system to capture transactions is required. The transaction data collected manually can later be processed in a batch. This would allow the MegaShop to continue selling goods.

Question 25 (b) (ii)

Sample answer:

Data mining would be advantageous to MegaShop as they would be able to combine transaction data and other data from multiple sources to identify customer behaviour from purchasing patterns. OLAP tools could be used in order to identify these patterns. MegaShop could then use this information to decide on appropriate business strategies.

Question 25 (b) (iii)

Answers could include:

Option 1 (TWO Systems)	Option 2 (ERP)
Two separate databases with restricted access to each	Centralised data, giving MegaShop and MiniShop access to current data
Two systems in two locations would each require support	ERP maintained by one team in one location
Data not integrated, not available to users in both locations concurrently.	Data from many departments in the organisation is integrated and available to all users
Will likely require a larger workforce	Potential to streamline workforce
Software updates required for two locations, with two update installations. Possibly higher costs for update.	Software update required once in one location. One licence purchase.

Question 25 (b) (iv)

Answers could include:

Example of application for a hospital

Discussion of:

- Integration of multiple sources of data, including patient data, medical records, pathology and imaging results, hospital admissions, staff details (HR), operating theatre bookings, employee payroll, patient accounts; accessed from appropriate ERP modules
- Organisation of above data into a relational database (or other suitable structure), stored on large capacity disk drives (or other suitable storage media) – answer could possibly refer to storage organisation or media – trades, sectors, cylinders. Data can be accessed by ERP modules by linking of relational tables.
- All users can access the most current data/information from a single source ie centralised data
- The ERP would offer higher quality data than separate systems as it would reduce or eliminate data redundancy and provide a single source of up-to-date information. Reduced risk of having unreliable patient data for a diagnosis.
- Different modules would provide data views of the available data, allowing different users to access data relevant to their needs, eg doctors and nurses could view patients info; accountants can access financial data.

Question 26 (a) (i)***Sample answer:***

What-if models allow alternatives to be compared and the best option to be identified.

Question 26 (a) (ii)***Sample answer:***

A macro can be used in a spreadsheet to automate tasks that are undertaken frequently, by automating a sequence of key strokes. A high level programming language is provided to perform this task.

Question 26 (a) (iii)***Answers could include:***

Automated decision making removes people from decisions, meaning that any unexpected situations or criteria are not considered. A poor decision may result from failure to consider all important and related factors that are not programmed into the automated decision making.

AND/OR

Automated decision making can be applied to simple, clear decisions like a stock re-order level. This removes the need for human intervention and can make processes more efficient.

Question 26 (b) (i)***Answers could include:***

The hardware necessary to support SiroFire includes:

- Fast and powerful processor(s) that are able to implement complex models in a short timeframe. Possibly multi processors
- Large storage capabilities to store the graphical images used by SiroFire
- High quality screens to provide clear images of the models calculated by SiroFire

Question 26 (b) (ii)***Answers could include:***

The category of DSS for SiroFire is unstructured. The models that SiroFire uses present predictions of the fire paths and people must ultimately make decisions about appropriate actions. The decisions require human judgement and insight into the present situation. The decisions are non-routine and must be considered for each separate situation that arises.

Note: Responses may also select ‘semi-structured’ as the category provided there is an appropriate justification. Structured decision making is not an acceptable answer.

Question 26 (b) (iii)***Sample answer:***

Some of the information in this DSS could be gathered from other authorities for example the information regarding weather conditions. Other data would require people to go to lots of different locations to observe and report conditions, like fuel load.

This means that data would need to be regularly gathered from lots of different sources. The timeframe for data collection and updating would need to be determined to be able to develop accurate models of the fire path. Data would then need to be collected and uploaded at regular intervals to ensure data was up-to-date and reliable in the event of any fire outbreak.

If data is not of high quality, not up-to-date, accurate and reliable, then the models of fire path provided by SiroFire will not be realistic. With unrealistic predictions personnel may be deployed to locations that are dangerous, possibly resulting in loss of life. Fire fighters may be sent to locations that are not under threat, when needed at other locations where the fire is burning. Loss of property and/or life could also occur in this situation.

Question 26 (b) (iv)***Answers could include:***

Answers could include discussion of multiple data sources for:

- Management of an agricultural region – weather data, stored data, underground water source, animal stocking rate, crop rotation, satellite images
- Emergency response and filtering management for commercial fishing – weather data, shipping/boat movements, seasonal movement of fish stocks, tides, currents, locations of emergency response vessels
- Tourism Information System – train/bus/plane timetables, accommodation location and rates, sight-seeing locations, restaurant data, cinema data, weather
- Tracking system for trucking transport and delivery company – commonly used routes, locations of trucks, location of bases, processing and delivery of goods, customer information/location, weather, traffic conditions

Processing in these systems could deploy the use of mathematical modelling, neural networks, intelligent agents or expert systems, with the resulting models displayed on geographical maps.

Note: An appropriate discussion related to the alternative application should be included in a response.

Question 27 (a) (i)***Sample answer:***

A robotic arm could be used in the manufacture of a motor vehicle for the accurate positioning of heavy components.

Question 27 (a) (ii)***Sample answer:***

Pressure sensor to detect a vehicle by the increased pressure compared to no pressure; motion sensor to detect the arrival of a vehicle; magnetic loop to detect the presence of a metal vehicle.

Question 27 (a) (iii)***Sample answer:***

CAD/CAM systems often use computer numerical control. NC are the coordinates of a point in space which are used to accurately position a manufacturing device to automate processes. CNC can be used in electronic assembly, or in drafting machines to produce construction drawings. They can also be used as cutting and shaping machines to fabricate components.

Question 27 (b) (i)
Answer could include:

Movement of intruders:

Optical sensors are used to measure changes in light. By recording the light levels at all positions in the environment, an intruder would be recognised by a change from the expected light level.

OR

Record temperature:

Resistance thermometers, thermocouples and thermistors are used to record air temperature. Any changes from the constant temperature provided from an air conditioner are recorded and notified to the control centre.

OR

Detect toxic gases and radiation:

Gas and radiation sensors record the standard in the room or at a particular location. Changes are sent to the control centre.

Question 27 (b) (ii)
Sample answer:

The IPTSecurity system is human-centred. The system acts to collect data and filter it in order to only present it to the human operations structures for any form of decision making or external reaction. The robots have no facilities to apprehend intruders, fight fires or stop gas or radiation leaks.

Question 27 (b) (iii)
Sample answer:

Process	Processing	Displaying
Receive data from screen robot	Record robot temperature data, gas and radiation data, intruder data – if anomaly then advise other robots to explore the anomaly	If anomaly then sound alarm and display Human to follow
Request robot to move location to assist robot notifying anomaly		

Question 27 (b) (iv)***Sample answer:***

Remotely monitored roaming robots can be used in any situation where there is an environment with some level of consistency. If monitors register movement of the environment outside set parameters then alarms can be triggered.

They can also be used in areas where human activity is not appropriate due to harmful physical or chemical environments. For instance, robots could be used to explore a coalmine after a disaster to map and measure the saturation. This information could be used to identify possible air pockets where survivors may be present.

Collecting:

The robots would need to have some sensors to collect:

1. Laser beams to gather the dimensions of width and height of all the available accessible locations
2. Temperature sensors to measure the temperature of the air to see if there is fire in the mine
3. Gas sensors to test for levels of oxygen
4. Stability sensors to test for areas subject to possible further collapse.

Question 28 (a) (i)***Sample answer:***

A simulation is an interactive computer-based system designed to provide a realistic imitation of a real-life situation.

Question 28 (a)(ii)***Sample answer:***

Tweening helps save time when producing animations because the animator is only required to draw key frames of each movement and the computer produces inbetween frames to make the transition smoother. The animator also chooses the number of inbetween frames.

Question 28 (a) (iii)***Sample answer:***

Printed and multimedia versions both present the same information for the same purpose. However, multimedia versions allow for:

- interactivity
- easier to edit and update
- less storage space required
- more up-to-date access to data

Whereas, printed media allows for:

- portability
- no need for technology but mass storage is required.

Question 28 (b) (i)***Answer could include:***

Accessibility issues can relate to students located in remote/ rural areas, international students, those who have no access to transport and students with disabilities who may have difficulties with travel or with vision.

Note: Students need to write characteristics and features relating to any of the above.

Question 28 (b) (ii)***Sample answer:***

Students will need to compress photos. Two methods include lossy and loss-less compression. Lossy compression provides a higher compression rate however a number of bytes are often removed from the file, reducing the quality of the image eg jpeg. Loss-less compression works by identifying repeated patterns in the image and can be restored in full eg gif. Therefore, to maintain the quality of the photos, students are recommended to use loss-less compression techniques.

Question 28 (b) (iii)***Answers could include:***

In multimedia there are five basic media types, these include text, graphics, audio, video and animation.

- Text is used throughout the system to do tasks such as enrolment, assignments, communicating in discussion forums and conference notes.
- Graphics are used in assignments, lecture notes, navigation and icons.
- Audio is used for communication in class between the user and virtual teacher.
- Videos are used as learning tools and are accessible to assist students with their work.
- Animations are used throughout to represent virtual classrooms, students and teachers.

- **Text** used in chat rooms, e-books, discussion forum posts and transcripts, conference notes, email, enrolment, assignments
- **Graphics** — images, illustrations, related to visual content of virtual classroom. Used in assignments, lecture notes, navigational elements (onscreen) and icons.
- **Audio** — Digitised sound – live or pre-recorded – allows teachers and students to verbally communicate ideas and subject material. Participants would need microphones, speakers and/or headphones
- **Video** — live streaming or pre-recorded material that can be accessed via the virtual classroom for lectures, detailed explanation or demonstration of techniques.
- **Animation** — Cell-based or Path-based techniques can be used to improve the presentation of material that requires movement or multiple images to present ideas.
- Web-based hyper-links to web-based resources.

Question 28 (b) (iv)***Answers could include:***

New or emerging technologies that can be used to enhance the system can include the use of:

- smart tablets
- developing apps
- improvements in wifi and 3G networks
- using virtual reality
- holographic images
- voice to text translator
- smart tv technology
- smart phone.

These emerging technologies provide flexibility through:

- giving teachers and students access from anywhere in the world as long as they have access to a computer and internet connection
- using a variety of hardware devices to access information on the go
- use of advanced technology to enhance and motivate student learning
- use of different technologies to improve teacher and student communication
- 3D virtual worlds: virtual reality training systems
- augmented reality
- voice recognition: voice to text conversion
- gesture-based inactivity
- text to sound conversion
- handwriting recognition
- closed captioned video
- Auslan signing
- plagiarism detection (assignments)
- text analysis for assignment marking