2017 HSC Information Processes and Technology Marking Guidelines

Section I

Multiple-choice Answer Key

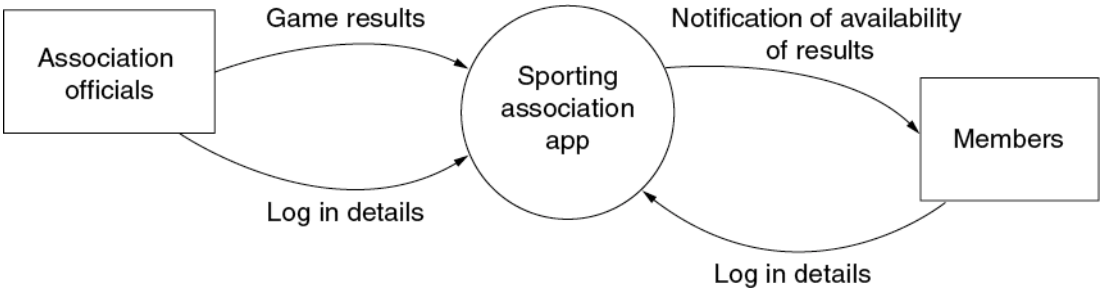
Question	Answer
1	C
2	D
3	C
4	B
5	C
6	A
7	D
8	A
9	B
10	C
11	A
12	C
13	C
14	D
15	D
16	A
17	D
18	A
19	B
20	D

Section II

Question 21 (a)

Criteria	Marks
• Draws a context diagram that represents the system	2
• Identifies a feature of a context diagram	1

Sample answer:



Question 21 (b)

Criteria	Marks
• Describes relevant information technology for the proposed system	3
• Outlines hardware AND/OR software for the proposed system	2
• Identifies a hardware OR software component	1

Sample answer:

Information technology includes the hardware and software used within an information system.

Hardware:

Smart phone – the mobile device is used by the official to input game results into the mobile application.

Web /DBMS Server – the hardware on which the association database/website resides and is accessed by end users.

Display device – the hardware used by the end user to view the website, for example, computer (desktop, laptop) or mobile device (smart phone, tablet, smart watch).

Communications hardware: mobile phone towers, modems, routers.

Software:

Application (app) software – the mobile app deployed via the official's smart phone to update results at the conclusion of each game.

Web browser – that allows end users access to the association website.

Database management software – used for storage/retrieval and analysis.

Question 21 (c)

Criteria	Marks
• Explains the advantages of using a mobile app system over a paper-based system	3
• Outlines some advantages of using a mobile app system over a paper-based system	2
• Identifies a feature of a paper-based or mobile app system	1

Sample answer:

The proposed mobile app system allows the sporting association to update results at the conclusion of each game, thereby improving the speed of publication of results to interested members. There are also advantages with respect to less physical storage needed and durability of the information when it is in a digital format. If the app were to include data validation, to ensure accuracy at collection, this would be advantageous to the association.

The app allows for interactivity, through the upload of images and video. The app will also allow for notifications to be sent to the user when results are published.

Question 22 (a)

Criteria	Marks
• Provides an outline of the data/information related to the scenario	2
• Identifies data/information	1

Sample answer:

- Date and time of assembly
- Video data is captured by the video cameras
- The live streaming software compiles the live video footage captured by the cameras into one stream. The live video stream is viewed as information on the school website.

Answers could include:

- Username and password
- Streaming content
- Captions
- Number of visitors logging in remotely.

Question 22 (b)

Criteria	Marks
• Describes the information processes of *collecting* and *processing* related to the system	3
• Outlines the information processes of *collecting* and *processing* related to the system	2
• Identifies a feature of *collecting* and/or *processing*	1

Sample answer:

Collecting occurs through the use of information technologies like digital video cameras and microphones. The cameras have inbuilt sensors that capture moments of the assembly through the lens. The cameras may also incorporate an in-built microphone that captures audio data.

Processing occurs within the digital cameras as they convert analogue to digital data (MP4), thereby encoding data suitable for streaming. Each camera has sufficient processing capability to enable it to prepare the data for transmitting and receiving. Mobile devices sync with the school website's live stream portal to enable real-time editing of footage.

Question 22 (c)

Criteria	Marks
• Identifies components of the system in terms of interpersonal relationships and virtual communities • Draws out and relates the implications of these	5
• Identifies some components of the system in terms of interpersonal relationships and virtual communities • Draws out and relates some implications of these	4
• Describes interpersonal relationships and virtual communities relevant to the scenario	3
• Outlines interpersonal relationships or virtual communities	2
• Provides some relevant information	1

Sample answer:

Electronic communication systems like the proposed *'assembly live streaming system'* allows for information to be shared in real time with authorised members of the school community via any internet connected device.

Interpersonal relationships

While this system would be advantageous for parents/carers to view assemblies and award ceremonies off-site, the issue of developing *interpersonal relationships* is often difficult via this medium. During face-to-face communication, body language and non-verbal communication can enhance the development of relationships that are important in this setting. Despite this challenge, interpersonal relationships could possibly be enhanced via this system, as communicating electronically can provide accessibility benefits. For example, the live video stream could be closed-captioned providing access for hearing impaired community members. Furthermore, with improved access off-site to school events, working parents can be more involved in whole school events. Live chat could also be an added feature that enables parents who can't attend to interact.

Virtual communities

The proposed system provides the benefits of a *virtual community* as access is not dependent on geographical location. In most virtual communities, access to the community is based on an invitation and is secured by a membership process and the use of an authentication protocol eg username and password. Parents/carers have access to the live stream that is password protected so that their participation in the virtual community is regulated by the school. This protects the privacy and identity of those staff and students featured in the award ceremony/speech giving. That said, there would be nothing stopping a member from disclosing their username and password to a broader audience, thereby allowing wider access. There would be incidences of hacking where non-members access photographic data of students which compromises security. Live chat could also open the possibility for people to post damaging comments about students or teachers.

Question 23 (a)

Criteria	Marks
• Provides a clear comparison of the features of a relational and flat-file database	3
• Describes features of a relational and/or flat-file database	2
• Identifies a feature of a database	1

Sample answer:

The records in a flat-file database are stored in a single table containing all of the available fields. A flat-file database contains redundant data as each field must be completed individually for each record.

A relational database contains two or more different tables that are linked by key fields (primary/foreign) that serve as unique identities that reduce data redundancy.

Question 23 (b)

Criteria	Marks
• Describes the benefits of normalising data	3
• Outlines benefits of normalising data	2
• Identifies a feature of normalising data	1

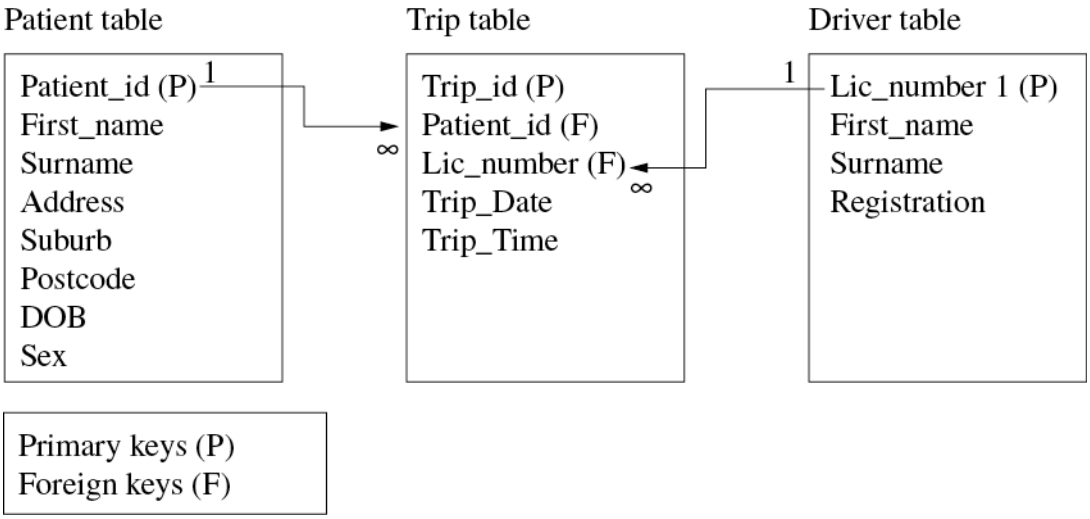
Sample answer:

Normalisation is the process that attempts to remove or reduce unnecessary repetition of data. Normalisation can improve the efficiency of a database by reducing the storage requirements, thereby enabling more efficient sorting, searching and querying. Normalisation can also assist in the elimination of data input errors through the use of data validation rules that can look up corresponding tables. It also minimises the amount of updating needed of the database.

Question 23 (c)

Criteria	Marks
• Clearly constructs a schematic diagram showing all components of a normalised database • Clearly identifies and labels the primary and foreign keys on the diagram • Shows linkages between tables	4
• Constructs a schematic diagram that shows some linkage between tables • Identifies primary and/or foreign keys	3
• Draws a series of tables with some labelled data labelled as a schema	2
• Provides some relevant information	1

Sample answer:



Question 24 (a)

Criteria	Marks
• Describes the process of handshaking in this scenario	3
• Outlines features of handshaking in this scenario	2
• Identifies a feature of handshaking	1

Sample answer:

Handshaking is the process whereby, during the initial phase of communication between two devices, the protocols are established and agreed on to allow the transmission to be successful. In this scenario, the handshaking takes place during the proximity of the mobile device to the terminal.

Question 24 (b)

Criteria	Marks
• Provides a discussion of the suitability of a named wireless technology demonstrating an understanding of the scenario	4
• Describes the suitability of a named wireless technology that could be used in this scenario	3
• Outlines features of a wireless technology for transmitting and receiving data	2
• Identifies a feature of transmitting and receiving data	1

Sample answer:

The devices in this scenario (smart phone and EFTPOS terminal) could use radio for transmitting and receiving data. Radio is suitable as both devices are able to establish a connection at distance on a pre-determined frequency and channel. The 802.11 wireless standard is a radio standard that utilises multiple channels in the 2.4 GHz and 5 gHz frequency ranges.

Transmitting and receiving encoded data can occur at distance with little interference, good signal quality, high speed transfer rates and low power usage.

Once the connection is established between the source (mobile device) and the destination (contactless terminal), data transmission occurs as the signals, or radio waves, travel through the communication medium (atmosphere).

Answers could include:

- Infrared
- Microwave
- RFID.

The discussion has to reference the hardware in the scenario and must address the suitability of its use.

Question 24 (c)

Criteria	Marks
• Provides an explanation of the security and legal issues arising from the use of wireless technology demonstrating a clear understanding of the scenario	5
• Provides a discussion of the security and legal issues arising from the use of wireless technology demonstrating understanding of the scenario	4
• Provides a description of security and/or legal issues arising from the use of wireless technology in this scenario	3
• Outlines security and/or legal issues regarding the use of wireless technology in this scenario	2
• Identifies an issue related to this scenario	1

Sample answer:

Security issues arising from the use of wireless technology include the physical security of devices. Both the phone and EFTPOS terminal can be locked with a PIN to prevent unauthorised transactions. All data should be encrypted prior to transmission to reduce the risks associated with skimming. Breaches of security can result in financial loss for all of the parties using the system (customers, store owners and bank).

Legal issues arise when skimming occurs. The Privacy Act 1988 protects personal information from being collected and used for purposes other than for use in the system without consent. Criminal law is applied to situations when there is a loss of money, property is stolen, or identity theft has occurred. Legal issues can be enforced by the courts, and penalties can be applied for breaking these laws.

Answers could include:

Security issues

- Smart phone – PIN and PUK code security are deterrents to smart phone theft.
- Data encryption – during transmission when using the wireless technology it is important to prevent smart phone skimming. Recorded data could include identity or payment information.
- Security software – to track and/or disable the smart phone in the event of it being stolen.
- Smart phone theft – may increase due to the use of the wireless technology.

Legal issues

- Privacy Act 1988 – breach of privacy law when skimming occurs.
- Privacy of the individual – when an individual's personal information has been used there is a legal requirement for both the bank and the individual to notify each party involved.
- Criminal law – applies in the case of money and/or personal information being stolen or misused.
- Identity theft – when a person's identity information is misused to gain financial advantage.
- Criminal activities which break security and legal considerations are identified as e-crime.

Section III

Question 25 (a)

Criteria	Marks
• Identifies the importance of a data warehouse in a transaction processing system	2
• Identifies a feature of a data warehouse	1

Sample answer:

A data warehouse in a transaction processing system stores transaction data. A data warehouse is a resource that can then be accessed by analysis tools to analyse its transaction data. A data warehouse allows data from the TPS to be analysed in isolation to minimise impact on the TPS.

Question 25 (b)

Criteria	Marks
• Explains how data mining could be an advantage to an organisation using an example	3
• Provides a description of an advantage of data mining to an organisation	2
• Identifies a feature of data mining	1

Sample answer:

Data mining of stored transaction data by a grocery store company of its customers' purchase history can help to shape the organisations activities. Data mining that specifically looks for trends, patterns and relationships can help improve the company's marketing, range of stock and service experiences in an effort to increase productivity and profits.

Data mining can also inform staffing requirements based on the trends of their customers' purchasing times.

Question 25 (c)

Criteria	Marks
• Provides similarities and/or differences in the use of a full backup and a partial backup	3
• Describes a full backup and a partial backup	2
• Identifies a feature of backup	1

Sample answer:

A full backup stores a copy of all files in a transaction processing system. The files are copied automatically at a pre-determined schedule and can consume large amounts of storage space. Full backups also utilise large amounts of network bandwidth which slows performance making it necessary to schedule the backup at a time that minimises this impact.

Partial backups are space saving because the volume of stored data is reduced by storing only new or recently changed files. This places less demand on storage space and network bandwidth so scheduling is more flexible. Partial backups may have higher processing overheads because each source file has to be compared to previously stored files to determine if the data is new or changed.

Question 25 (d)

Criteria	Marks
• Explains how a credit card transaction involves both batch and real-time processing	4
• Describes features of both batch and real-time processing used in a credit card transaction	3
• Provides a description of either batch or real-time processing used in credit card transaction	2
• Identifies a feature of batch or real-time processing	1

Sample answer:

Real-time processing occurs at the time a credit card transaction takes place. The data of the card and transaction details are collected and sent to the cardholder to check if the card is lost/stolen and that the customer has sufficient credit remaining to cover the transaction, then funds are reserved.

Batch processing occurs at the end of each day or the next day when the card's bank transfers the funds from the customer's account to the merchant's account. A company's daily credit card transactions are batch processed together so a single large transfer takes place with details of each individual transaction provided.

Question 25 (e) (i)

Criteria	Marks
• Describes the manual procedures to be considered if the online system is not available	3
• Outlines features of manual processing related to the scenario	2
• Identifies a feature of manual processing	1

Sample answer:

The manual processing required if the online system is not available will begin with the company employees following a step-by-step processing procedure (controlled processing). Prior to the event a company staff member would print a paper based attendee list. Staff at the door would need to manually check and record the validity of the attendee's ticket(s) against the printed list. The collected data would need to be manually entered by an employee once the online system is back online so that the certificates can be generated.

Question 25 (e) (ii)

Criteria	Marks
• Clearly explains the contribution of the features of the online data collection form to the operation of the transaction processing system	5
• Explains features of the online data collection form in the operation of this transaction processing system	4
• Outlines features of the online data collection form needed in the operation of this transaction processing system	3
• Outlines features of the online data collection form	2
• Identifies a feature of the online data collection form	1

Sample answer:

Effective design of the online data collection form can contribute to the integrity (correctness and accuracy) of data collected in an online transaction processing system.

The accuracy of data collected can be enhanced through the use of data validation techniques eg radio buttons, drop-down lists and in-form querying. When a user inputs their suburb, city/state in the appropriate fields, the in-form querying could insert the postcode into the appropriate field, thereby reducing user input errors, resulting in improved accuracy. Compulsory fields could also be implemented in the online data collection form that would prohibit the user from submitting the form unless all fields contain data.

A logically sequenced user interface can also contribute to the accuracy of the data collected in the ticketing system. Data entry fields would need to be positioned in a sequential order (eg salutation, first name and surname) that is predictable for the user. Furthermore, all fields would need to be fully labelled to allow for clear identification.

The collection form should be scalable to allow for completion on various screen resolutions eg computer screens, mobile devices.

Question 26 (a)

Criteria	Marks
• Identifies the purpose of a macro in a spreadsheet	2
• Identifies a feature of a macro in a speadsheet	1

Sample answer:

The purpose of a macro is to allow the users to combine a series of repetitive actions or complex steps into one action to reduce time, minimise mistakes and improve ease of use when using a spreadsheet.

Question 26 (b)

Criteria	Marks
• Demonstrates a clear understanding of a knowledge engineer's role in the creation of an expert system using an example	3
• Outlines the role of a knowledge engineer in the creation of an expert system	2
• Identifies a feature of an expert system or the role of a knowledge engineer	1

Sample answer:

A knowledge engineer is a specialist who builds the knowledge base in an expert system. They work with experts to create the rules that can be used by the expert system. For example, in a medical diagnostic system, the knowledge engineer would create the rules to determine the appropriate medical diagnosis from the symptoms put into the system by the doctor and suggest the possible treatments required.

Question 26 (c)

Criteria	Marks
• Provides a description of the process of forward chaining used by inference engines in expert systems	3
• Outlines the process of forward chaining used in expert systems	2
• Identifies a feature of a chaining strategy used in expert systems	1

Sample answer:

Forward chaining starts with the available data and uses inference rules to extract more data (from a system or end user) until a goal is reached. An inference engine using forward chaining searches the inference rules until it finds one where the *If* clause is known to be true. When such a rule is found, the engine can conclude, or infer, the *Then* clause, resulting in the addition of new information to its data. Inference engines will iterate this process until a goal is reached.

Question 26 (d)

Criteria	Marks
• Clearly distinguishes between structured and unstructured decision making, providing an example of each	4
• Describes structured and unstructured decision making, providing an example of each	3
• Outlines structured and/or unstructured decision making	2
• Identifies a feature of either structured or unstructured decision making	1

Sample answer:

An example of a structured decision is whether to offer a home loan to a customer. It is structured because there are clear conditions that need to be met, and an offer can be made if a customer meets all the conditions. This type of decision is often made rationally. An example of an unstructured decision would be whether to start a business. There are lots of variables that are unknown, and a previous decision to open a business in one location cannot be directly applied in a new situation.

Answers could include:

Structured decisions: product reorder triggered by reorder levels; offer of an insurance policy at a particular price.

Unstructured decision: whether to purchase stocks and shares; triage of a patient in an emergency situation.

Question 26 (e) (i)

Criteria	Marks
• Describes the characteristics and features of the responsibilities of the school in relation to the use of the data	3
• Outlines the responsibilities of the school	2
• Identifies a feature relevant to the scenario	1

Sample answer:

The school has the responsibility to ensure that the data collected for use in this decision support system is used both legally and ethically.

The data in the system should enable advisors to make sound decisions, give valid, useful and accurate subject selection advice to students requiring their help. The advice should be free from bias and should provide students with choices that suit their strengths and capabilities thus maximising their chances of success.

The data in the system should improve the consistency of decision making and minimise the chance of erroneous inferences.

The school cannot disclose personal information or use the data for any purpose other than what it was collected for without violating the Privacy Act.

It is unethical to collect data for one purpose and then use it for another without obtaining prior consent.

Question 26 (e) (ii)

Criteria	Marks
• Provides a clear discussion of the suitability of spreadsheets and neural networks in this decision support system	5
• Provides a discussion of the suitability of spreadsheets and neural networks in this decision support system	4
• Describes the use of spreadsheets and neural networks in this decision support system	3
• Outlines the use of spreadsheets and/or neural networks	2
• Identifies a feature of spreadsheets and/or neural networks	1

Sample answer:

Spreadsheets can be used to support decision making in this scenario because multiple sheets containing data from a range of relevant sources can be easily linked. This feature makes the system invaluable for analysing trends and making predictions based on the available data. This allows the system to generate suggested HSC subject combinations/preferences for the student to consider that are aligned with their personal interests and career aspirations.

Neural networks can assist in the decision-making process because these systems can assist in pattern recognition. Analysis of trend data is important in the selection of pathways for future events. Decision support systems based on neural networks can apply certainty factors to recognised patterns in the data and they can learn to adjust the output for a range of semi-structured and unstructured decisions. A student may have interests that favour more than one career pathway and a neural network would be able to generate unique suggestions using this technique.

Question 27 (a)

Criteria	Marks
• Identifies the purpose of damping in an automated manufacturing system	2
• Identifies a feature of damping	1

Sample answer:

The purpose of damping in an automated system is to modify the magnitude of response in an actuator such as a motor that opens and closes a gate. Damping ensures the smooth operation of the components, minimising severe or jerky movements, decreased vibration, bouncing or potentially damaging acceleration during movement.

Question 27 (b)

Criteria	Marks
• Describes the benefits of using an automated manufacturing system	3
• Outlines benefits of using automated manufacturing system	2
• Identifies a benefit	1

Sample answer:

Using an AMS has benefits such as improved safety for workers. This means that workers are involved in the non-hazardous areas of manufacturing**.** Another benefit includes improved quality and quality control ensuring manufacturing is more accurate and therefore less likely to be interrupted. There is a reduction in the number of tasks carried out by workers which increases the consistency of manufacturing and increases productivity. If a problem occurs in manufacturing the process can be stopped quickly. All of these benefits will mean a reduction in cost and improved accuracy in design.

Question 27 (c)

Criteria	Marks
• Explains the difference between an actuator and a sensor, with an appropriate example	3
• Outlines a sensor and an actuator	2
• Identifies a feature of a sensor or actuator	1

Sample answer:

Actuators, like motors, are output devices that do something, ie move.

Sensors are input devices. They detect light, heat, pressure etc. Sensors need to receive the data in order to activate an actuator to work.

An example would be in an automatic door. When the proximity sensor detects that someone is walking to the door, the actuator motor is engaged to open the door. The door is opened and once the sensor detects that the doorway is clear, the actuator would be activated to close the door.

Question 27 (d)

Criteria	Marks
• Compares continuous and batch manufacturing systems with an appropriate example of each	4
• Describes continuous and batch manufacturing with an example of each	3
• Outlines continuous and/or batch manufacturing systems	2
• Identifies a feature of continuous or batch manufacturing systems	1

Sample answer:

An example of batch manufacturing would be the production of the same car in specific colours. Each colour is produced using a batch process whereby a pre-determined number of each colour is produced. This number can be changed to meet manufacturing quotas, eg 15 cars per day: 5 red, 5 blue and 5 silver could be changed to 10 silver, 4 blue, 1 red.

An example of continuous manufacturing is the production of electricity and oil refining. Both operate for long periods of time due to continual demand. Both can operate for one or two years without shutdown. Workers can work in shifts. A high degree of skill is not required as there are no changes to the production process.

Question 27 (e) (i)

Criteria	Marks
• Describes how RFID tags can assist in inventory tracking	3
• Outlines how RFID tags can assist in inventory tracking	2
• Identifies a feature of RFID tags or inventory tracking	1

Sample answer:

Inventory in this automated system can be tracked using radio frequency identification tags. Each item stored in the warehouse can be fitted with an RFID tag containing electronically stored data (details) unique to that item.

The data on an RFID tag can be scanned and the stored details read at distance without handling the item.

Items stored in the warehouse can be easily located by the delivery robots that are fitted with a RFID scanner/reader.

Once an item is retrieved from the warehouse, the inventory database is updated and tracking can continue along its journey to the packaging area.

Warehouse inventory can be tracked by comparison of the RFID data collected from items moving in or out of the warehouse.

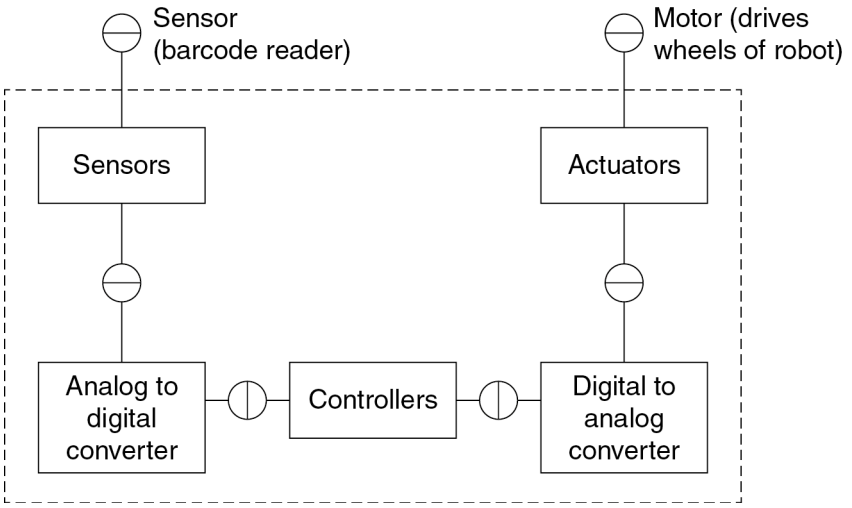
Inventory tracking can also occur using the data collected by the scanners/readers in the packaging area.

Question 27 (e) (ii)

Criteria	Marks
• Clearly explains the operation of the robot in this scenario using a labelled block diagram	5
• Provides some explanation of the operation of the robot in this scenario using a labelled block diagram • Displays most components of a block diagram	4
• Describes the operation of the robot in this scenario using a block diagram • Displays some components of a block diagram	3
• Outlines the operation of the robot in this scenario using a generic block diagram • Displays some system boundaries including a sensor and an actuator	2
• Provides some relevant information	1

Sample answer:

When the controller receives a request for an order the robot automatically locates the item using the appropriate sensors. This information is acted upon by the controller that in turn sends instructions to the motors – actuators. The robot could navigate its path with the inclusion of other sensors. This block diagram shows the relationship between the barcode reader, controllers and actuators in this scenario.



Question 28 (a)

Criteria	Marks
• Provides reasons why a speaker is considered a display device	2
• Identifies a feature of a speaker OR audio data	1

Sample answer:

The hardware in a home entertainment system works together to display content. A speaker is a display device as it outputs audio content (multimedia content) contained within a multimedia system.

Question 28 (b)

Criteria	Marks
• Describes the information technology advances that have led to the adoption and widespread use of multimedia streaming services	3
• Outlines the information technology advances that have led to the adoption and widespread use of multimedia streaming services	2
• Identifies hardware/software used in multimedia streaming services	1

Sample answer:

Multimedia streaming services are a result of the convergence of technologies including increased processing and storage capacity of smart TVs, smart phones and application servers, increased transmission speeds (wired/wireless), higher quality multimedia file formats and improved compression codecs. Together with the affordability of these services in comparison to purchasing and owning a physical copy of the media, the technologies for organising and displaying are far more affordable and accessible than ever before.

Question 28 (c)

Criteria	Marks
• Describes the process of analog to digital conversion, using an example	3
• Outlines the process of analog to digital conversion	2
• Identifies a feature of analog and/or digital	1

Sample answer:

When a telephone call reaches the voice (virtual) mail of a recipient, the analog or audio recording of the message is encoded into digital form. The digital signal is stored in the mailbox. When the voice mail is retrieved from the mailbox, it is then decoded into a sound wave (analog) to be heard through the speaker.

Question 28 (d)

Criteria	Marks
• Clearly explains the relationship between high quality multimedia content and the storage and retrieval demands on the hardware of a smart phone	4
• Demonstrates a sound understanding of high quality multimedia content and storage and retrieval with some link to the demands on the hardware	3
• Outlines the storage and/or the retrieval demands of multimedia content on the hardware of a smart phone	2
• Identifies a feature of multimedia used in a smart phone OR • Identifies a feature of storage/retrieval in a smart phone	1

Sample answer:

High quality multimedia content places demands on the hardware of a smart phone in terms of storage/retrieval.

Larger storage capacity is required to store high quality photos, videos and high-resolution media. The capacity of the internal processor needs to be able to cope with the increased demand of these high quality photos, videos and high-resolution media.

Smart phones can contain both internal and external storage eg RAM and external storage (micro SD cards), and SIMs (subscriber identification module). While much of the multimedia consumption now takes place via streaming, on-board storage is required to store and retrieve photographs, audio, video and applications (apps). The amount of on-board storage has increased over time with most vendors now offering 32 GB as a minimum with up to 128 GB. This is directly linked to improvements in camera quality, which therefore results in larger file sizes.

Question 28 (e) (i)

Criteria	Marks
• Describes the hardware and software required to create the content in the multimedia app	3
• Outlines the hardware and/or software required to create the content in the multimedia app	2
• Identifies a feature of the relevant hardware OR software	1

Sample answer:

There is a range of hardware and software required to create the content for the multimedia system. The hardware includes a high-resolution digital camera and a powerful authoring computer (high powered processor, large amounts of RAM, large secondary storage preferably solid state drive and high end video card). A range of connection mediums, such as USB or Wi-Fi connection, is required to download images from the camera to the authoring computer. The software includes photo-editing software that has the ability to digitally alter images and 'stitch' together individual images to create an immersive view in the app. The app development software (coding language) will also be required in the development stage of this multimedia system.

Answers could include:

Device drivers, operating systems, web browsers.

Question 28 (e) (ii)

Criteria	Marks
• Clearly explains how virtual reality can potentially be used outside the field of education	5
• Provides some explanation of how virtual reality can potentially be used outside the field of education	4
• Describes how virtual reality can potentially be used outside the field of education	3
• Outlines an alternative use of the virtual reality multimedia system	2
• Identifies a feature of a virtual reality multimedia system	1

Sample answer:

Virtual reality multimedia systems that simulate real-world experiences are being used across a range of industries including:

- education and training – training personnel eg aircraft, medical and military training
- travel and tourism – virtual tours of historical buildings/landmarks
- architectural/building design – enabling the clients to visualise a space before construction
- entertainment – virtual reality gaming, media consumption eg immersive video.

In the past, the enormous cost of hardware and software made the use of virtual reality prohibitive for many businesses. With the convergence of technologies, namely the increased processing power and transmission speeds of mobile devices, coupled with the availability of low cost VR viewers, the use of VR has become more attainable.

Architects are currently using virtual reality technologies to give clients the opportunity to experience a 'walk through' the 3-dimensional architectural design constructed in CAD software. This 3-dimensional visualisation allows the clients to engage in an immersive experience and then can thereby make decisions prior to construction commencing. This can be achieved through the use of smart phone hardware that can access a CAD file either stored on removable storage (mini-SD card) or downloaded via an internet connection.

2017 HSC Information Processes and Technology Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	9.1 Documentation	H5.1
2	1	9.3 Social and ethical issues	H3.2
3	1	9.1 Documentation	H6.1
4	1	9.1 Identification of an approach	H6.2
5	1	9.3 Network administrator tasks	H3.1
6	1	9.1 Development approach	H5.1
7	1	9.1 Feasibility study	H6.2
8	1	9.3 Hardware in communication	H1.1
9	1	9.1 Identifying scheduling	H6.2
10	1	9.2 Database file size	H1.1
11	1	9.2 Data type	H6.1
12	1	9.3 Security	H6.1
13	1	9.2 Database types	H4.1
14	1	9.1 Data flow diagram	H6.1
15	1	9.1 Prototype	H6.1
16	1	9.3 Parity	H2.1
17	1	9.2 Purpose of schema	H7.2
18	1	9.3 Security of networks	H6.1
19	1	9.3 Protocols and levels	H2.1
20	1	9.2 Dataflow diagram recognition SQL understanding	H2.2

Section II

Question	Marks	Content	Syllabus outcomes
21 (a)	2	9.1 Construct context diagram	H5.1, H5.2
21 (b)	3	9.1 Describe information technology	H1.1
21 (c)	3	9.2 Advantages of computer-based organisation methods	H2.2
22 (a)	2	9.1 Identify data/information	H1.2
22 (b)	3	9.1 Describe information processes	H2.1, H2.2
22 (c)	5	9.3 Issues related to communication system	H3.1, H5.2
23 (a)	3	9.2 Comparison of databases	H6.2
23 (b)	3	9.2 Normalisation	H5.1
23 (c)	4	9.2 Construct a database schema	H6.1, H6.2
24 (a)	3	9.3 Describe the protocols in communication (handshaking)	H1.2
24 (b)	4	9.3 Data transmission and receiving	H3.1, H3.2

Question	Marks	Content	Syllabus outcomes
24 (c)	5	9.3 Issues related to communication systems	H5.2, H6.1

Section III

Question	Marks	Content	Syllabus outcomes
25 (a)	2	Data warehouse use	H4.1
25 (b)	3	Explain data mining	H4.1, H6.1
25 (c)	3	Data backup	H1.2, H2.1
25 (d)	4	Batch and real-time processing	H6.1, H6.2
25 (e) (i)	3	Manual processing	H6.1, H6.2
25 (e) (ii)	5	Online data collection	H1.2, H6.2
26 (a)	2	Macros in a spreadsheet	H1.1, H2.1
26 (b)	3	Role of the knowledge engineer	H2.2, H3.1
26 (c)	3	Forward chaining in an expert system	H1.2, H3.1
26 (d)	4	Structured and unstructured decision making	H1.2, H4.1
26 (e) (i)	3	Issues related to decision support responsibilities	H2.1, H2.2
26 (e) (ii)	5	Tools supporting decision making	H5.2, H6.1
27 (a)	2	Damping	H1.1, H2.1
27 (b)	3	Advantages of AMS	H2.1, H6.1
27 (c)	3	Differences between actuators and sensors	H2.1, H5.1
27 (d)	4	Processing – production systems	H2.1, H5.1
27 (e) (i)	3	Inventory tracking	H5.1, H6.1
27 (e) (ii)	5	Construct a block diagram	H6.2, H7.2
28 (a)	2	Display device in MMS	H1.2, H5.1
28 (b)	3	Technological advances (streaming multimedia)	H1.2, H4.1
28 (c)	3	Analog to digital conversion	H1.2, H2.2
28 (d)	4	Hardware demands of storage and retrieval in MMS	H1.2, H2.1
28 (e) (i)	3	Information technology in the creation of multimedia in an MMS	H5.1, H6.1
28 (e) (ii)	5	Potential uses of virtual reality (MMS) outside education	H1.2, H4.1