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Information Communication Technology  
Educators of NSW Incorporated.

Suggested Solutions  
to  
2018 HSC Exams

INFORMATION PROCESSES  
AND TECHNOLOGY

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# 2018 HSC IPT Suggested Solutions

## SECTION 1 Multiple Choice

1	D	Project management simple recollection question.																				
2	A	Simple Error Detection question.																				
3	B	Communication tools & trends. Keyword: Newsfeed.																				
4	C	Metadata understanding tested, as well as understanding of HTML tags.																				
5	A	Approaches question. Very tricky question, relies on the students knowing the features and advantages of each approach. Agile is the <b>best</b> answer here as the question discusses a small skilled team and a short period of time. Prototyping would've also been chosen by students as it is an iterative approach. Modifying a solution is a trick here to get the students to choose customisation.																				
6	A	Simple protocol question.																				
7	D	From Year 11 content, the Information Processes. Answer C here includes analysing and the question does not mention how the data will be further used.																				
8	A	Transmission media question. Phones cannot use Fibre Optics and Satellite here would be too expensive.																				
9	D	Communications Protocols question.																				
10	B	Topologies question. Combination of star and bus topologies.																				
11	B	NESA answer is a gateway for connecting the 2 networks within the hybrid topology, however, Bus and Star topologies both use Ethernet protocol and therefore a Bridge would also be a viable option here.																				
12	D	Simple documentation question. Students should know which stage each document is produced and what is included. Feasibility (Planning), Data dictionary & Data flow diagram (Designing), Requirements report (Understanding the problem)																				
13	C	Simple project management question.																				
14	A	Tricky question as the scenario is describing data warehousing and then asks how the company will ANALYSE the data collected.																				
15	B	Different Location trials – PILOT Rolled out across the state over a year - PHASED																				
16	A	Simple Communications question and recall.																				
17	B	Data validation and screen design question Z is a radio button, and X is an input mask, therefore leaving only B as the answer.																				
18	D	Data Type question X includes spaces which can only be a text option. Radio buttons hold Boolean values.																				
19	B	From the diagram the only considerations come from when the applicant has both communication skills AND teamwork skills as well as a business degree. 5 years minimum relevant experience is a bonus.																				
20	C	<p>KEY (p) = primary key</p> <table border="1"> <thead> <tr> <th></th> <th><i>Book and Book_Author</i></th> <th><i>Author and Book_Author</i></th> <th><i>Book and Publisher</i></th> </tr> </thead> <tbody> <tr> <td>A.</td> <td>One to many</td> <td><del>One to one</del></td> <td>Many to one</td> </tr> <tr> <td>B.</td> <td><del>Many to one</del></td> <td><del>One to one</del></td> <td><del>One to many</del></td> </tr> <tr> <td>C.</td> <td>One to many</td> <td>One to many</td> <td>Many to one</td> </tr> <tr> <td>D.</td> <td><del>One to one</del></td> <td><del>Many to one</del></td> <td><del>One to many</del></td> </tr> </tbody> </table>		<i>Book and Book_Author</i>	<i>Author and Book_Author</i>	<i>Book and Publisher</i>	A.	One to many	<del>One to one</del>	Many to one	B.	<del>Many to one</del>	<del>One to one</del>	<del>One to many</del>	C.	One to many	One to many	Many to one	D.	<del>One to one</del>	<del>Many to one</del>	<del>One to many</del>
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## SECTION 2: Core Short Answer

### Question 21 (a)

Hardware: Computer or touchscreen device (tablet/mobile phone), mail; web & database server

Software: Database, Internet browser, Website

- Students only asked to identify (name) the required hardware and software.

### Question 21 (b)

An SMS messaging system would allow the dental care centre's website to contact their clients when a booking is made regarding the details of their appointments. The SMS would include the treatment type, selected dentist as well as the date and time of the appointment that has been selected by the client on the website.

A reminder SMS can also be sent by the system in the days prior to the appointment and the system can then receive Yes/No confirmations back via text from the client.

SMS messaging allows the client to instantly receive the message and respond without having to be connected to the Internet.

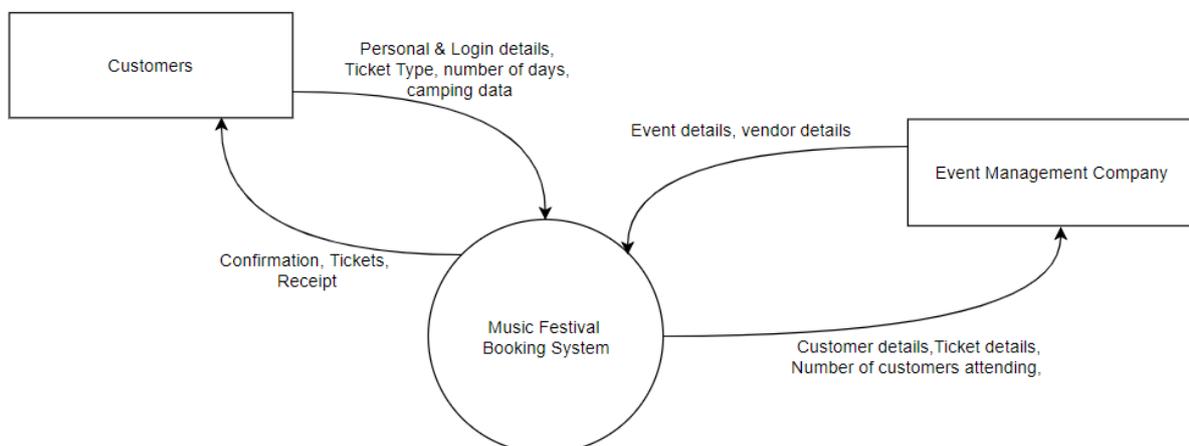
- Question requires the student to give reasons and advantages for their chosen messaging system.
- Students could also include an email system or In app notifications with relevant justifications.

### Question 21 (c)

The relational database, which holds all the appointment data can be first queried to isolate all the appointments scheduled for a single dentist on a particular day. The data can then be organised by time scheduled and stored in the system. A macro can also be included within the query to allow a user to indicate which dentist they wish to print appointments for and what date, allowing for a simple use query to save time and effort creating an individual query per day for each dentist. The DBMS can then produce a printable report of this data with all the details including type of treatment, time and allocated length of appointment.

- Students have to here discuss where the data comes from and that the data should be isolated by a query before creating a report.

### Question 22 (a)



- Diagram created in Draw.io (Allows for curved arrows easily and for text & symbols to be locked together for moving).
- Students should include as much detail from the scenario as possible.
- Note the question indicates that students only create a context diagram representing the booking system and not the new payment system

### Question 22 (b)

The events management company analyse the data collected from events to plan for future events. Data collected via the festival card can be warehoused for future mining in order to find patterns and use these to predict consumer behaviour at future, similar events, to see which vendors are popular and which are not, what times festival goers are purchasing from vendors in order to bring popular vendors back for future festivals. Management could also see how many people are purchasing their tickets before the event, to receive the discount and how many are waiting until just before the event to analyse the effectiveness of their advertisement.

- Students should be giving ways the data collected should/would be used for future events and festivals, how management can benefit from the analysis as well as indicating what data would, when analysed, give this feedback.

### Question 22 (c)

#### **Security of customer personal & payment details**

The events management company needs to ensure that the facility for placing money onto the festival card is secure in order to keep the customers personal & payment details safe. Data should be also encrypted, during transmission and while data is saved in the database for future use. The company should also ensure that the connection they use for internet banking is secure and encrypted so all transactions made are kept secure from potential hackers.

Passwords, for both employee and customer, should be secure and use capitals and numbers for better security – they system should ensure that a password meets this criteria.

Cards should have individual barcodes and be safe guarded against easy replication or RFID skimmers. Lost cards or replicated cards should be easily cancelled and identified if someone tries to use it. An app which stores your card details can be used to cancel cards or record a card's activity.

#### **Privacy & Unauthorised use of customer personal & payment details**

Customer's details must be kept private and not sold for the gain of the management system. Levels of passwords and access should be implemented to stop employees from accessing customer data through the system.

#### **Accuracy of data collected**

Using a card allows for the data of the transaction to be stored and then later mined in order to improve/ make predictions based on trends, for future events.

#### **Alternate procedures for system failure**

There must be an option for a backup in case of system failure or Internet issues. Manual systems should be in place and all vendors should be aware of how they work. ATMs could be set up for the purpose of removing cash from the festival card.

- Students should indicate what the issues are, how they can affect the data or the customer or the company and how they could be fixed/addressed.

### Question 23 (a)

The project manager is tasked with communicating with the client in order to deduce and negotiate the requirements of the system, the client's budget and the time constraints. In order to do his the project manager must have good active listening skills, showing the client that they are listening as well as ensuring that the correct information is gained easily and the client is happy.

When communicating with the development team the project manager must also have conflict resolution skills in order to make sure the team is working efficiently and to break appart and solve

an issue when it occurs, either between two team members or about the work to be completed or the requirements of the system.

- Students could also mention:

Negotiation skills: in order to make the clients wishes suit their budget and the time of the project, as customers often want more then they can afford in time and money.

Interview Skills: To ask the right questions in order to gain the correct information easily and ask open ended questions to decipher exactly what the client wants.

Team Building Skills: To ensure the development team is working with each other efficiently.

- Students must ensure they discuss HOW the project manager could use the skills with BOTH the client and the development team.

Question 23 (b)

Development of Online Ordering System								
Task	Build and Test							
	Design and Refine interface							
	Technical Benefit study							
	Requirements gathering							
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Time (Weeks)								

Or

Development of Online Ordering System								
Time (Weeks)	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
Task								
Requirements gathering								
Technical Benefit study								
Design and Refine interface								
Build and Test								

Question 23 (c)

Protocols are used to ensure successful communication over the app and for security. SSL protocol ensures that the app is secured for the customer to place their order, enter their personal details and pay for their order and that the collected and transferred data is encrypted. The Internet transfer of this data needs to be encrypted to ensure this data is kept safe during transmission from the customer’s phone to the restaurant’s server as well as when stored for future use by the app.

The TCP & IP protocols are standard Internet transmission protocols used to safely and efficiently transfer the data over the Internet. They are used to standardise transmission and to ensure that data is travelling without error from source to destination.

TCP breaks the order data into smaller packets then addresses, with the destination and source IP address and numbers each packet to ensure they can be reformed in order.

IP finds the most efficient path to send the data on and transmits the data, in order to prevent delays and potential data corruption. TCP then forms the packets back into the original data at the other end in the correct order.

- Students must give reasons why these protocols are used as well as how they work within this communications system to transmit an order.

#### Question 24 (a)

A prototype allows for the project team to provide the company with a working model in which to demonstrate how the system will work in real world conditions, rather than simulations. The system relies on sensor data from bushland and thereby allows the company to test the system and then perform minor changes as the company sees what is effective and what is not within the prototype regarding the size of the machine and the sensitivity of the sensors.

A prototype also provides for a way to visualise the requirements of the system and to have a working model without a set of rigid requirements if the company is not sure how the new system should work best.

A prototype would also be used to gain feedback from the client easily and create versions of the system to easily roll back to.

- Students should give advantages to prototypes here. Redefining of requirements, Testing in real conditions, clients can see exactly what the system would look like, easy to make changes to the system when given feedback from the client.

#### Question 24 (b)

Live data is collected from the system's intended environment. It is used to test the system's effectiveness in actual conditions in order to see how well the system will work. This would allow the company to test each sensor node and how it is working to sample the data from the environment as well as see how quickly the nodes will communicate within the bushland where there is a lot of distance and interference.

Using simulated data does not allow for this, and volume data would only test for performance when the system is overloaded.

- Students should give advantages of live data over simulated.

#### Question 24 (c)

**Between Sensor nodes:** Communication in bushland would be difficult with wired media, satellite transmission would be too expensive and not necessary and trees could block microwave transmission. It would therefore be best to have the sensor nodes connected with encrypted radio wireless transmission as a 100m distance between nodes is sufficient without repeaters to boost signals. It would not be efficient if the signal could be intercepted between sensors and therefore the signals should be encrypted for security.

**Between the sensor nodes and the command centre:** As the nodes and the command centre need to be connected over great distance to isolate the location of the fire it is important to connect the devices with wireless transmission, for the same distance and interference reasons both satellite and microwave transmission would be ineffective. The devices could also be quite a distance away from the command centre so Internet 4G connectivity would be the best and most reliable transmission media. Again the signals here are essential to the efficiency of the system and therefore the network transmission media must be encrypted.

**Within the command centre:** The command centre is stationary and therefore can be connected internally with wired transmission media. The use of fibre optic wired transmission would ensure no interference from unexpected sources, as well as better security from outside hackers. The media is also very fast for transmission which would ensure messages from the sensor nodes can be relayed internally fast and efficiently, making the best of the systems response to a bush fire.

- Students must indicate their justification/reasons for each decision of transmission media for each of the 3 sections. Better answers would include a reason why other media would not be suitable.

## SECTION 3 Option Topics Short Answer

### TRANSACTION PROCESSING SYSTEMS

#### Question 25 (a)

Batch processing is slower to process and provide confirmation than Real time processing. Data must also be securely stored during the process.

- Students are asked to give reasons against batch processing rather than define batch processing.

#### Question 25 (b)

Web-based systems require an Internet connection and online access to a database, for example an online reservation system like Booking.com. They provide instant access and confirmation and usually provide emailed tickets or booking data. The customers use these systems themselves and are responsible for entering data and filling in an online form.

Non-web-based systems do not require an internet connection, a website or a browser, nor an online collection form. For example calling a hotel to book a room. The systems are designed to look similar and allow for most of the same data to be collected, except a customer's login details. Generally an employee will complete the data entry and selections. Data is then stored in the database and the employee will generally initiate the sending of the customer's confirmation and required data.

- Non-Web-based systems can still be computer based systems – they just do not require an internet connection or online database. Using cash to purchase an item is not an adequate example for non-web-based.
- Students must provide a clear example of both web-based and non-web-based systems.
- Other Web-based examples
  - Checking in to a flight online
  - Airline reservation system
  - Internet banking
- Other Non-Web-based examples
  - Checking into a flight at the terminal of an airport
  - POS in a shop
  - Phone based systems
- Batch vs Real time is also not an acceptable way to differentiate between systems as not all non-web systems are batch.

#### Question 25 (c)

A Management Information System (MIS) provides a company with the means to effectively run a business, to create rosters; order stock and keep accurate stock counts and calculate hours and pay. They use the transaction data, dates and times, inventory data as well as products/services sold, collected by a Transaction Processing System (TPS) to assist the system in effectively providing better services to clients and to provide management with data to analyse in order to better manage and improve their system.

Data from the TPS can be used by the MIS to create more efficient employee rosters based on when people are shopping or can be used for replenishing stock when quantities are low.

- A definition of an MIS and a TPS isn't enough. Students must show how the two systems work together or share data.

### Question 25 (d)

Employees:

Advantages – Employees can focus on completing orders and making coffee without having to stop and serve customers, as the customers are placing their orders themselves, and thus the employee is no longer going back and forth between tasks.

The app also allows for an accurate way of collecting orders and serves as data validation, ensuring the employee has an accurate order to complete and doesn't accidentally take the wrong order from the customer in the noisy environment.

Disadvantages- The changing nature of work does, however, affect the relationship and interpersonal skills of the employee to customer relationship. Employees also no longer know their regulars and cannot converse with them and potentially make the customer come back purely for the individual service they receive.

Employees can feel like the tasks are not varied and therefore can begin to resent the job or develop an RSI from no variety of tasks.

Customer:

Advantages- wait times are no longer an issue as the order can be placed before arriving at the coffee shop and therefore customers do not have to spend time watching their coffee being made.

This is particularly good if a customer is in a rush or behind schedule on a particular day.

The data validation on the app also ensure the customer can easily place their order using radio buttons, sliders and list box options. Customers can also log into the app so they don't have to continuously enter their details or payment information making the process easier and faster.

The app may also be able to store the details of your favourite coffee/order to be an option for faster entry every day.

Disadvantages- The online nature of the app means there is a need for added security of data and the app needs to be adequately secured.

The changing nature of work puts the focus of the data entry on the customer and removes the daily interaction and the relationship the customer may make with their favourite barista.

- Students must give advantage**S** and disadvantage**S** for **BOTH** employees **AND** customers as well as reasons.

### Question 25 (e) i)

Each transaction and the associated data must be stored and secured by the system. A transaction log holds time stamped data about each hire and the person's account details as well as the location of the bike at both pick up and drop off locations. This allows for any discrepancies at the end of the month to be checked as well as a summary to be created and as a batch, the total to be paid calculated and invoices to be created and sent.

### Question 25 (e) ii)

**Data Security:** It is important that the customers log in details and payment details as well as their locations is kept protected, secure and encrypted during transmission of payment at the end of the month, when saved in the system's database as well as when a code is sent at the point of hiring. Passwords need to be strong and include capitals and numbers and backups of the transaction log and all other system data created on a regular basis in case of system failure.

**Data Integrity:** Data must be accurate and reliable and thus should be validated upon data entry and consistently verified. Customer details should be collected via a validated online form with checkboxes or radio buttons, range checks, list options and input masks to ensure the data is in a format that is appropriate and so that the customer is aware of how data is required to be entered, thus leaving little room for user error when entering data. Payment details should be verified but not re-entered before monthly payment so as not to charge the wrong account and the customers contact details such as emails and phone numbers should also be checked upon log in. Verification also ensure that the customer login details match the system's stored data for the security of the customer and ease of use of the system.

**Data Quality:** It is important that the data collected is reliable and therefore useful for the system. Therefore location data should be collected via a phone's GPS system for accuracy and therefore is appropriate for locating the closest bike for the customer to hire. The correct bike being located would also ensure the correct unlock code is being send to the customer.

## **DECISION SUPPORT SYSTEMS**

Question 25 (a)

Question 25 (b)

Question 25 (c)

Question 25 (d)

Question 25 (e) i)

Question 25 (e) ii)

**AUTOMATED MANUFACTURING SYSTEMS**

Question 25 (a)

Question 25 (b)

Question 25 (c)

Question 25 (d)

Question 25 (e) i)

Question 25 (e) ii)

## MULTIMEDIA SYSTEMS

### Question 25 (a)

Integrity, or usefulness and appropriateness of data is important as the data used in a multimedia system must be copyright free and also protected against copyright. All media should be free of plagiarism and should be only used with the permission of the original author. Original, created media should also covered by copyright.

All data used should be correct, reliable to the source and validated.

### Question 25 (b)

Cell based animation is much more time intensive and harder to create than Path based animation. Cell Based involves the animator creating each individual, slightly altered, frame in order to create the illusion of movement between the objects. E.g. the creation of early animated Disney films such as Snow White and the Seven Dwarves which was animated by hand, drawing each individual image slightly different to the one before.

Whereas path based animation involves less work from the animator. The animator creates the key start and end frames as well as the path of motion and the software fills in the in between frames. The process is called "tweening". Tweening is faster and less labour intensive than cell based animation, however, is less precise. This process allows for more movement with little effort and grander productions. E.g. creating a shape or motion tween in Adobe Animate, or creating a digital animation such as newer 21<sup>st</sup> century Disney animated films such as Coco.

- Students should **compare** both path based and cell based animation techniques based on what level of input the software and animator has.
- An adequate example of both is required.

### Question 25 (c)

A project manager supports an entire multimedia project as well as the development team. They discuss criteria and requirements with the client and solve issues with the design/development team. They clarify and seek feedback from clients and ensure that the development team is on budget and time schedule. They ensure the development of a multimedia product is completed to the client's specifications and to a high standard.

Technical staff are responsible for ensuring the system will work within the original environment and also that the existing system/ set up and the new system will interface with each other. They discuss the hardware specifications with the design team and contribute to designing the basis of a system as a system designer would.

Technical staff are also responsible for instillation of the system once completed and ensuring the ongoing maintenance of the system and future updates.

### Question 25 (d)

In order to create an interactive blog and all the required media there must be dedicated software for each media type as well as an online blog platform.

A web-based blog platform, such as Wikispaces, WordPress or Wix is needed to host the site, create/host/provide the web address as well as the facility for log in and managing/editing access for the sporting club. It could also give information to the club about people who view their pages and what information is the most popular. An RSS feed could be included for the social media feed as well as a link to/from a social media platform.

A web browser would also be necessary to view and log into the blogging website and to manage the login process. As well as to update and add content to the blogging website.

In order to create and edit any videos of the games played a video editing software is needed, such as Adobe Premiere Pro or iMovie. The software would then need to export the view in a suitable format for streaming within the blog.

An audio editing software, E.g. Audacity, may also be necessary in conjunction with creating videos and ensuring the captured audio is of high quality.

To add images to the image gallery an image editor is required to manipulate and export any taken images in a suitable format E.g. JPG for web viewing quality and small file sizes

- Students should indicate HOW the software would be used and for what media type.

#### Question 25 (e) i)

The interactive user guide is a newer multimedia version of a user guide and is therefore can provide instructions in not only text, but also video and audio instructions which would assist them visually in the hiring processes.

A user poses a question and the information is provided to them in video/audio format as well as available in text, in much the same way as a traditional information kiosk as one would go and ask an employee or read in a printed manual.

- Students should explain the similarity of a printed and multimedia version of the same content here.

#### Question 25 (e) ii)

In order to display the data and information, particularly video data there needs to be a high resolution screen and good quality speakers for the audio. The videos need to be clear and high quality in order to play and for the information exchange to be successful.

Processing of requests for information as well as the encoding and coding of data needs to be with a high quality processor. The instructional videos must be rendered in such a way that they have quality for playing on the device. E.g. MP4 videos and MP3 audio files have higher compression but still retain enough quality.

Smaller file sizes are necessary for storage and retrieval. Files must be compressed enough to download faster and not use as much 4G Internet, they therefore would also take up less storage space. The videos and audio must be able to be downloaded at an appropriate speed and clarity for the user's device.

- Hardware requirements for displaying, processing and storing and retrieving need to be considered along with the user's need for speed and yet quality for video and audio.