J A M E S R U S E
AGRICULTURAL HIGH SCHOOL

2010
ACCELERATED HSC COURSE
INTERNAL EXAMINATION

Information Processes and Technology

FINAL PRELIMINARY ASSESSMENT TASK

General Instructions

- Reading time – 3 minutes
- Working time – 60 minutes
- Write using black or blue pen
- You may use a calculator
- Record your answers in the space provided for each question
- Attempt all questions (no optional sections)
- Mark allocations are provided for each question

Total marks: 50

Section A Pages 2–6

20 marks

- Attempt Questions 1–20
- Allow about 20 minutes for this section

Section B Pages 7–11

30 marks

- Attempt Questions 21–23
- Allow about 40 minutes for this section

SECTION A ANSWER SHEET

Question 1 to 20: Multiple Choice

Mark the correct box with an X.

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

SECTION A

Multiple Choice

1. Which of the following is true of information technology?
    A. It is the result of science being applied to a practical problem
    B. It includes hardware and software
    C. It encompasses all the tools used to perform a system's information processes
    D. All of the above

2. The difference between data validation and data integrity is:
    A. There is no difference, they are interchangeable terms
    B. Validation ensures the data is reasonable and is in the correct format at entry time; integrity is about ensuring it is correct
    C. Validation is about the screen items used to make up computer-based forms, whereas integrity is to do with the underlying data
    D. Integrity ensures the data is reasonable and is in the correct format at entry time; validation is about ensuring it is correct

3. Jack downloads some images from the web to include on a commercial website. Apparently, the images do not include any sort of copyright mark, legal notice or license agreement.

    Which of the following is true?
    A. As there is no mark, notice or agreement attached, Jack is free to use the images for any personal or commercial purpose
    B. The images may or may not be covered by copyright, but due to the lack of legal notification, it is reasonable to assume that the images are in the public domain
    C. All published images are automatically covered by copyright, so Jack cannot legally reproduce any of the content he has downloaded
    D. None of the above

Questions 4 and 5 relate to *data compression*.

4. Applications that process text and numerical data rarely include compression functions since:
    A. The data is already tightly packed, so little can be gained by compression
    B. It is rare for such files to be of sufficient size to warrant compression
    C. The data cannot be compressed without corruption or loss of quality
    D. There is no standard file format for storing compressed text or numerical data

5. Compression functionality is included within most image, audio & video applications because:
   A. Without compression, the size of such files would almost always be excessively large
   B. Decompressing the data as it is displayed is often faster than retrieving and displaying the uncompressed equivalent
   C. Such data is more efficiently compressed and decompressed using techniques specific to each type of data
   D. All of the above

6. Students who arrive late to school are required to scan in via their fingerprints. Which of the following shows the data collected and the information produced from it?

	Data	Information
A.	Fingerprint	Late slip notice
B.	Times of arrival	Summary report of absentee students
C.	Fingerprint	Identity of late student
D.	Student birth date	Grade of student

7. Choose which statements correctly apply to the collecting process:
   I. It involves deciding what data to collect
   II. It includes locating data for collection
   A. I only
   B. II only
   C. Both I and II
   D. Neither I nor II

8. Full duplex transmission requires:
   A. Two communication channels
   B. A single bi-directional channel
   C. Simultaneous bi-directional transfer
   D. A telephone line

9. Secondary storage is the primary limiting factor that constrains analysing speed because:
   A. It is significantly slower than RAM or the CPU
   B. It is permanent storage
   C. Hard disks are more prone to failure than RAM or CPU circuits
   D. Computers use secondary storage continuously whilst RAM and the CPU are used only when they are required

10. The Braille system represents characters:
    A. Using a grid of pins that rise and fall
    B. Using hammers and anvils
    C. By embossing the outline of each character
    D. With different combinations of raised dots

11. Approximately how much memory is needed to hold a single 1024 × 768 pixel screen with a colour depth of 24 bits?
    A. 0.75MB
    B. 2.25MB
    C. 6MB
    D. 18MB

12. In a RAID device, the process of striping is best described as:
    A. Storing the same data on multiple drives
    B. Splitting up data and storing each chunk simultaneously on different drives
    C. A technique for improving read times
    D. A method for improving fault tolerance

13. In terms of data organisation, the essential difference between a bitmap and vector image is:
    A. Bitmaps require greater storage than vector images
    B. Vector images can be scaled without loss of quality whilst bitmaps cannot
    C. Bitmaps are composed of individual pixels; vectors describe shapes mathematically
    D. Vectors are composed of individual pixels; bitmaps describe shapes mathematically

14. Which of the following is NOT an example of processing?
    A. Adjusting the font size of a text paragraph
    B. Applying spelling and grammar corrections
    C. Cropping a photo
    D. Cutting out sections of a video

15. Digital data has all the following advantages over other data types, EXCEPT:
    A. Ease of transmission
    B. Ability to represent all media types
    C. Easily understood by humans
    D. Superior analysing and processing speeds

16. Spreadsheets are commonly used for creating 'What-if' scenarios because:
    A. They automatically recalculate all outputs each time an input is altered
    B. Most scenarios involve processing numerical data
    C. Commonly the processing utilises mathematical and statistical functions
    D. All of the above

17. Choose which statements have resulted from the increasing prevalence of telecommunications in contemporary society:
    I. Greater uncertainty about the quality of accessible data
    II. Added consistency in the nature of work policies and practices
        A. I only
        B. II only
        C. Both I and II
        D. Neither I nor II

18. Which of the following is NOT a potential ethical issue for businesses and organisations with sensitive or confidential data?
    A. Data being accessed by unauthorised users
    B. Circumvention of software security measures
    C. Data corruption through deterioration of storage media
    D. Authorised users retrieving data for illicit purposes

19. Digital data can only be:
    A. Stored in one of two states
    B. Processed in primary storage
    C. An approximation of a continuous data source
    D. Analysed and displayed by specialised hardware

20. In the debate on climate change, competing groups have used data analysis to present scientific findings that seem to directly contradict each other. This is primarily an example of:
    A. Bias
    B. Data incorrectly analysed
    C. Unauthorised analysis of data
    D. Linking databases for analysis

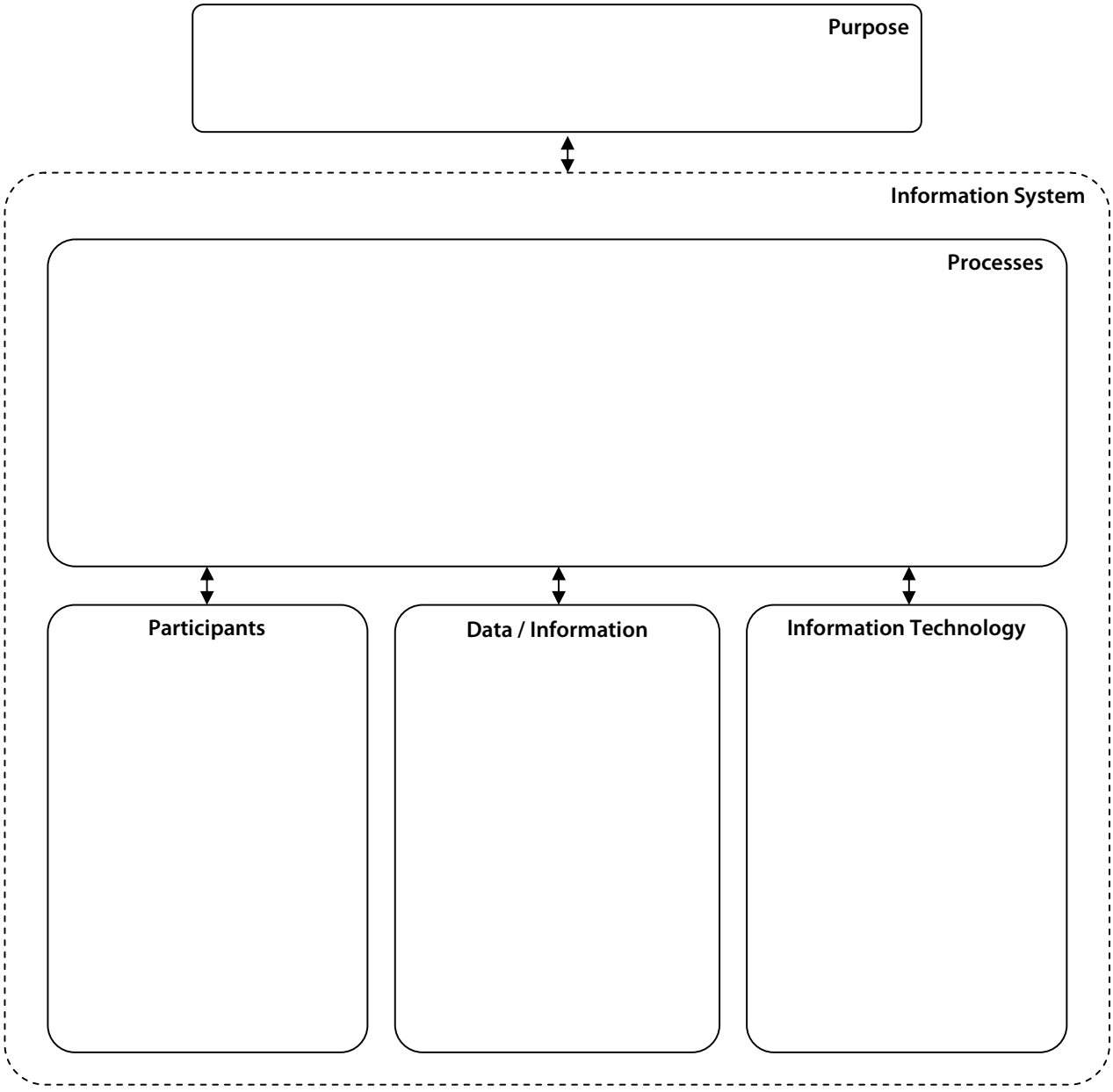
SECTION B

Extended Answer

QUESTION 21 **[13 marks]**

Every ambulance in New South Wales is equipped with a vast array of technologies designed to make each vehicle capable of receiving, processing and relaying tremendous amounts of data live in the field. Several information systems reside within an ambulance, devoted to distinct but complementary objectives: assessing patients, administering urgent medical care, and communicating with hospitals or other emergency services (such as police and fire brigades).

a. Complete the labelled spaces in the diagram below by providing specific examples of each feature from the information system scenario described above. **[8]**



b. Outline the social and ethical issues related to integrating such an extensive range of technology into an ambulance. **[2]**

c. In July of this year, 178 ambulances were upgraded to utilise highly advanced satellite phones that run independently of the tower-based mobile phone network. Making specific reference to the features of this information system, justify the $372,000 cost associated with installing and maintaining these devices. **[3]**

QUESTION 22 **[7 marks]**

On August 19, Facebook CEO Mark Zuckerberg announced *Facebook Places*, a "geo-social" feature that allows users to seamlessly share their location with pre-approved friends and contacts.

Users with internet-enabled mobile phones can install an application on their device that allows them to broadcast their physical location with a single action (dubbed "checking in"). Based on their mobile phone signal, their approximate position is calculated and friends in the vicinity are automatically notified on their respective devices.

a. Describe the information processes involved when a user checks in. **[4]**

b. Immediately after the announcement, privacy and freedom of information watchdog organisations – both government and private – raised several serious concerns over the new service. Whilst *Places* is designed to share data only once given permission, it actively records your history of locations and is able to share this data with other online services that are connected with Facebook. Explain how this data could be abused. **[3]**

b. [continued]

QUESTION 23 **[10 marks]**

a. Identify two implications of data ownership. **[1]**

b. A single pixel is represented in RGB 24-bit colour in decimal as (225, 239, 35). Describe this colour and then show how the pixel's data would be represented in binary. **[3]**

c. The Mathematics department is currently in the process of digitising its substantial collection of learning and assessment resources, due to problems it is experiencing with locating relevant materials for supporting student learning. Outline the weaknesses of storing data using non-computer-based methods in this situation, and then explain the reasons why manual files have been continually maintained despite such weaknesses. **[6]**

c. [continued]

- END OF EXAM -

- BLANK PAGE -

» Section A

1 mk for each question.

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

» Section B

Question 21

Part (a)

½ mk: purpose (e.g. "to enable ambulances to aid injured persons and communicate with co-operating emergency services")

½ mk: participants (e.g. paramedics, ambulance driver, hospital staff, co-operating emergency services); lost mark if patients were included

1 mk: at least 3 examples of relevant data/information (e.g. patient personal details, condition metrics, medical history, casualty reports)

1 mk: at least 2 examples of information technology (e.g. on-board computer, satellite phone, GPS navigation unit, patient assessment equipment such as ECG or heart-rate monitor)

5 mks: at least 5 distinct examples of correctly identified processes

- COLLECTING: patient's pulse and blood pressure are measured
- ORGANISING: electrical signals from an ECG are converted to a visual waveform for displaying to paramedics and medical staff
- ANALYSING: patient identity is compared to patient database; paramedics search through listing of conditions and relevant treatments
- STORING & RETRIEVING: patient's medical history is accessed from existing database
- TRANSMITTING & RECEIVING: hospital is contacted and advised of incoming casualties; number and severity of injuries is communicated to police and fire services
- PROCESSING: register of available equipment and materials is updated to reflect usage
- DISPLAYING: fastest route to emergency location is shown on GPS navigation screen

Part (b)

1 mk: for each issue that is correctly identified with its main features (maximum 2)

- Changing nature of work: increased level of technological competence required on top of medical knowledge; roles made redundant by automated machines; employment rise in biomedical and telecommunications engineers)
- Increased likelihood of hardware failure
- Privacy/unauthorised access to sensitive data (patient details and medical history)
- Misdiagnosis/malpractice through incorrect use of technology, but more accurate/faster diagnoses possible through more efficient tools
- Communication lines: broader but potential for catastrophic failure rather than mere deterioration of signal quality
- Expense (taxpayer cost)

–½ mk: if an issue is only identified without its main features

Part (c)

1 mk: for each point of justification provided (maximum 3)

- Mobile phone coverage is subject to availability and proximity of reception towers; remote areas may lack reception, but this is overcome through use of satellite system
- Ambulances by their nature are required to service areas where emergencies have taken place; towers (or their support infrastructure, such as electrical lines) may have sustained damaged thus preventing mobile phone signals from being relayed
- The independent nature of the satellite phone system protects the privacy and increases the security of sensitive communications

Question 22

Part (a)

1 mk: for each specific process referred to and advantages identified (maximum 4)

- COLLECTING: mobile device registers user's interaction with interface (e.g. selection and navigation of menus and buttons)
- ORGANISING / PROCESSING: Account data (e.g. email address, password) and location are encrypted for transmitting and receiving.
- TRANSMITTING & RECEIVING: mobile device relays "check-in" request to Facebook servers via internet connection
- ANALYSING: User's position is calculated (i.e. "triangulated") based on mobile phone signal
- STORING & RETRIEVING: list of potential locations is retrieved from Facebook servers and electronic map database

- PROCESSING: current position is updated on Facebook profile page
- DISPLAYING: New position is shown on devices of nearby contacts

Part (b)

1 mk: for each method of data abuse that is explained (maximum 3)

- History of past locations and access to current location is only as secure as contacts' accounts and passwords; thus unauthorised users could access privileged data
- Location history could be analysed and activity patterns can be identified, enabling stalkers or kidnappers to track down individuals
- Data could be sold to advertising and research agencies
- Unsolicited data mining can take place whereby locations are cross-checked with purchases and other online activities
- Location history could be hacked, falsified and used to frame an individual or group of people for a crime
- Provides a wealth of data to enable accurate identity theft

Question 23

Part (a)

½ mk: for each implication correctly identified (maximum 2): rights over reproduction, control over distribution and profitability

Part (b)

½ mk: colour correctly described as a shade of yellow

2 mks: all numbers correctly converted to binary: 11100001 11101111 00100011

½ mk: 24 bits represented (i.e. 00100011 instead of just 100011)

Part (c)

1 mk: for each weakness of manual data analysis outlined (maximum 3)

- Time consuming to search through due to physical medium
- Difficult or impossible to re-sort according to different categories or criteria
- Viewable by a very limited number of personnel simultaneously
- Local access only (i.e. lacks portability)

1 mk: for each legitimate reason why manual files are continually maintained (maximum 3)

- Significant upfront technology costs
- Data volume begins small and easy to manage without technological means
- Minimal training required to store, retrieve and process
- Flexibility and diversity of data type