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Centre Number

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Student Number

**2011**  
**TRIAL HIGHER SCHOOL CERTIFICATE  
EXAMINATION**

# Information Processes and Technology

Afternoon Session  
Wednesday, 3 August 2011

**Total marks – 100**

**Section I**

Pages 2–7

**20 marks**

- Attempt Questions 1–20
- Allow about 40 minutes for this section

**Section II**

Pages 8–11

**40 marks**

- Attempt Questions 21–24
- Allow about 1 hour and 10 minutes for this section

**Section III**

Pages 12–17

**40 marks**

- Attempt TWO questions from Questions 25–28
- Allow about 1 hour and 10 minutes for this section

## General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using blue or black pen
- Draw diagrams using pencil
- Write your Centre Number and Student Number on this page

### Disclaimer

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**3200-1**

## Section I

**20 marks**

**Attempt Questions 1 – 20**

**Allow about 40 minutes for this section**

Use the multiple-choice answer sheet for Questions 1–20.

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- 1 Which of the following best describes the role of a project leader?
  - (A) Co-ordinates a team of programmers and analysts.
  - (B) Solves hardware and software problems.
  - (C) Creates test data for the new system.
  - (D) Provides technical support to staff.
  
- 2 Which of the following transmits data using high frequency radio waves?
  - (A) UTP
  - (B) Coaxial
  - (C) Microwave
  - (D) Satellite
  
- 3 A company temporarily hires a team of programmers to develop a new program for them. This is known as
  - (A) hiring.
  - (B) outsourcing.
  - (C) prototyping.
  - (D) schedule Feasibility.
  
- 4 An example of a security method that uses unique biological traits for identification, is known as a
  - (A) password.
  - (B) retinal scan.
  - (C) encrypted file.
  - (D) keypad access code.

- 5 Checksum is a method of detecting errors during data transmission. It works by
- (A) adding the number of bits at each end and comparing the totals.
  - (B) adding the number of bits at each end and dividing by a constant.
  - (C) adding the number of bits in each byte and detecting whether they are odd or even.
  - (D) adding the numbers of bits in each byte and adding a start and stop bit for each character.
- 6 Deskilling refers to
- (A) the use of technology to perform menial tasks.
  - (B) the use of technology to work from home rather than travelling to work.
  - (C) the loss of skills that workers may experience as a result of automation.
  - (D) the introduction of new skills that workers must use as a result of automation.
- 7 LANs commonly use one of two protocols for data transmission. These are
- (A) Bus and star.
  - (B) Ethernet and star.
  - (C) Bus and token ring.
  - (D) Ethernet and token ring.
- 8 In a database, which would be the best data type for gender?
- (A) Number
  - (B) Boolean
  - (C) Character
  - (D) Alphanumeric
- 9 What type of cabling is made from pure glass?
- (A) Coaxial cable
  - (B) Fibre optic cable
  - (C) Shielded twisted pair
  - (D) Unshielded twisted pair

**10** Tom is creating a digital checklist so that he can go to each computer workstation in the office and evaluate it. What is the best screen design element to use for this job?

- (A) Text boxes.
- (B) Radio buttons.
- (C) Check boxes.
- (D) Drop down menu.

Use the database below to answer questions 11 and 12.

Vet\_patients

| Animal_ID | Type | DOB      | Fee     |
|-----------|------|----------|---------|
| C2210     | Cat  | 12/12/10 | \$30.00 |
| C3210     | Dog  | 1/01/10  | \$50.00 |
| C2000     | Cat  | 9/07/10  | \$35.00 |
| B1234     | Bird | 19/05/11 | \$25.00 |
| B0101     | Bird | 12/03/11 | \$28.00 |

**11** Which one of the following is a search specification where Animal\_ID starts with C2?

- (A) C?
- (B) C\*
- (C) C2?
- (D) C2\*

- 12 The following is an SQL query for the Vet\_patients database. What would result from this query?

```
SELECT Animal_ID, Fee
FROM Vet_patients
WHERE Fee >= 25 AND DOB > 12/03/11
```

(A)

| Animal_ID | Fee     |
|-----------|---------|
| B1234     | \$25.00 |

(B)

| Animal_ID | Fee     |
|-----------|---------|
| B1234     | \$25.00 |
| B0101     | \$28.00 |

(C)

| Animal_ID | Type | DOB      |
|-----------|------|----------|
| B1234     | Bird | 19/05/11 |
| B0101     | Bird | 12/03/11 |
| C2210     | Cat  | 12/12/10 |

(D)

| Animal_ID | Type | DOB      | Fee     |
|-----------|------|----------|---------|
| B1234     | Bird | 19/05/11 | \$25.00 |
| B0101     | Bird | 12/03/11 | \$28.00 |

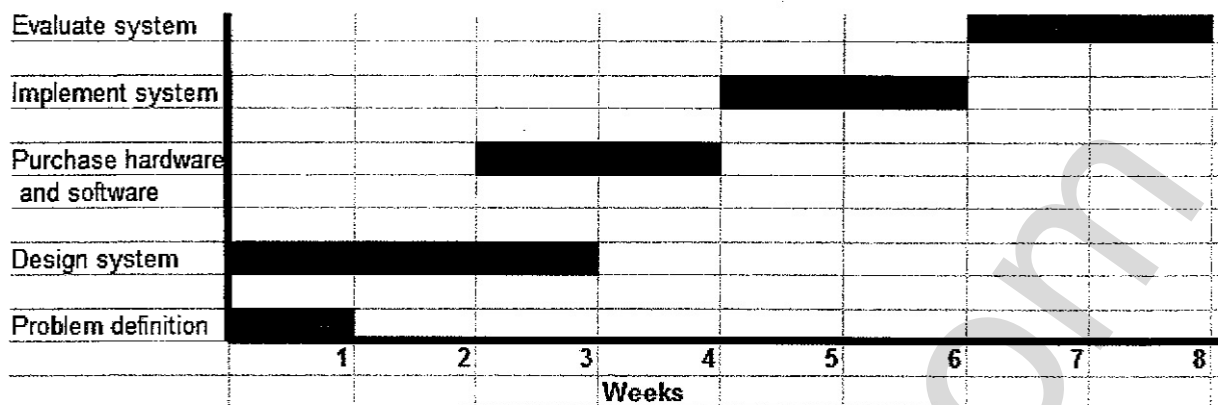
- 13 Storyboards are used to

- (A) symbolically represent hardware and software in a system.
- (B) represent screens in a system and the navigation between them.
- (C) graphically show the flow of data between processes in a system.
- (D) indicate pathways for processing data showing different outcomes.

- 14 A retail outlet keeps a database on its customers and the purchases they make. The manager uses this information and passes it on to another organization. What issue does this fall under?

- (A) Ethics
- (B) Equity
- (C) Copyright
- (D) Intellectual property

Use the diagram below to answer Questions 15 to 17.



- 15 In system development the diagram above is known as a
- (A) Time line
  - (B) Gantt chart
  - (C) Decision tree
  - (D) Context diagram
- 16 At which stage of system development would this diagram have been created?
- (A) Understanding the problem.
  - (B) Planning.
  - (C) Designing.
  - (D) Implementation.
- 17 How many weeks does it take to design the system and purchase the hardware and software?
- (A) 2
  - (B) 3
  - (C) 4
  - (D) 5

**18** What is TCP/IP?

- (A) A communications protocol used for Internet access.
- (B) A set of protocols that provides security over the internet.
- (C) A set of communications standards for digital transmission.
- (D) An intranet protocol for communication and electronic mail.

**19** Which of the following are found in the Application level of the Communication Systems Framework model?

- (A) Message and medium.
- (B) Switching and routing.
- (C) Source and destination.
- (D) Transmitter and receiver.

**20** Which of the following storage media, represents sequential access?

- (A) CD
- (B) DVD
- (C) Optical disk
- (D) Magnetic tape

## Section II

40 marks

Attempt Questions 21 – 24

Allow about 1 hour and 10 minutes for this section

Answer each section in a SEPARATE writing booklet.

If you include diagrams in your answer make sure they are clearly labelled.

**Question 21** (10 marks) Use a SEPARATE writing booklet.

Use the following information to answer parts (a), (b) and (c).

Booking flights online is an information system that most airlines use today to enable passengers to purchase flights online. Passengers can search, select, and purchase an e-ticket in a matter of minutes. When a reservation is made an e-ticket is generated and digitally recorded on the airlines computer database. Once purchased, passengers can manage their flights online by checking their reservations, selecting seats, adding requests and printing boarding passes.

The screenshot shows the Qantas website's flight search interface. At the top is the Qantas logo with the tagline 'Spirit of Australia'. Below it is a navigation bar with links: Home, Plan, Book, Fly, Frequent Flyer, Business Solutions, About Qantas, and Help. A search bar is located on the right. The main content area is titled 'Flights' and includes a progress bar with steps: 1. Search, 2. Select, 3. Review, 4. Passengers, 5. Payment, and 6. Confirmation. The 'Search' step is currently active. Below the progress bar, there are options for 'Flights from Australia (Change)' and a 'Help?' link. The search criteria section includes 'Your past flight searches', a dropdown menu, and radio buttons for 'Return', 'One Way', 'Multi-City', and 'Round the World'. The 'From' field is set to 'Sydney' and the 'To' field is set to 'Cape Town'. The 'Depart' date is 'Feb 2011 Fri 11' and the 'Return' date is 'Feb 2011 Fri 11'. There is a checkbox for 'Flexible with dates'. The 'Adults' field is set to '1', 'Children' to '0', and 'Infants' to '0'. The 'Travel Class' is set to 'Economy'. There is a 'Points+Pay' button. At the bottom of the page, there is a footer with links: Contacts, Privacy & Security, Terms of Use, Viewing Tips, Worldwide Sites, and Qantas Home. The Jetstar logo is also visible.

Source: <http://www.qantas.com.au/travel/airlines/flight-search/global/en> (2011)

- (a) Outline the purpose of the system, data/information and information technology (IT), relating to the online flight booking information system. 3
- (b) Describe the storing and retrieving, transmitting and receiving and the displaying of data when a flight is booked online. 3
- (c) Discuss THREE potential issues relating to this information system that could impact on the participants involved. 4

**Question 22 (10 marks) Use a separate writing booklet**

- (a) What is a schema and how does it assist developers in the creation of a relational database? **2**
- (b) A new project for an online relational database (DB) system is to be introduced for all hospitals in Australia. This will enable individual hospital databases to be linked so that all appropriate hospital staff can access, edit, maintain and store all patient records online from any location in Australia.
- (i) Recommend and justify which conversion method would be most appropriate to implement this project. **2**
- (ii) Create a data dictionary that could be used for the patient table of the database (include at least five fields). **3**
- (iii) Discuss the social and ethical implications of having all hospitals and their staff in Australia being able to access patient records. **3**

**Question 23** (10 marks) Use a separate writing booklet

- (a) Define the term metadata. Give ONE example. 2
- (b) Search Engines can be utilised to locate data on the internet. There are many different search engines on the internet, you have been asked to develop a new search engine called "NEED\_IT" that can be used to look for images, websites and books.
- (i) Identify the participants that may be involved in the development of a "Search Engine Website". 2
- (ii) Create and correctly label a storyboard for the newly developed search engine called "NEED\_IT". 4
- (iii) Construct a query that should be entered into a search engine field to locate data where the website is an Australian domain and the URL contains "sport". 2

**Question 24** (10 marks) Use a separate writing booklet

- (a) Many organisations are setting up intranets and extranets, as they have many benefits to the organisation and its participants.
- (i) What is the difference between an intranet and an extranet? 2
  - (ii) Describe how intranet technology best supports communication within a school environment. 2
- (b) Outline the purpose of the following communication protocols. 3
- SSL
  - http
  - smtp
- (c) A small business has set up an online store. Discuss **THREE** issues that need to be considered. 3

### Section III

**40 marks**

**Attempt TWO questions from Questions 25 – 28**

**Allow about 1 hour and 10 minutes for this section**

Answer each section in a SEPARATE writing booklet.

If you include diagrams in your answer make sure they are clearly labelled.

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#### **Question 25 – Transaction Processing Systems (20 marks)**

- (a) Define the term OCR and explain how it is used in a transaction processing system. **2**
- (b) Explain the reason why bias may be an issue in the data gathering process. Provide an example. **2**
- (c) What is the difference between data integrity and data validation? Provide examples to support your answer. **4**

**Question 25 continues on page 13**

## Question 25 (continued)

Use the following information to answer part (d).

### **Safety cameras**

New safety cameras are being introduced to make intersections safer by enforcing both speeding and red-light offences.

Safety cameras use digital technology that is capable of detecting both red-light and speeding offences and will be replacing the current outdated wet-film red-light cameras that began operating in 1988.



<http://www.rta.nsw.gov.au/roadsafety/speedandspeedcameras/safetycameras/index.html>

### **Safety camera frequently asked questions**

#### **Why are we replacing the existing red-light cameras with new safety cameras?**

In 2008 there were 20 fatalities and 4398 injuries at intersections with traffic lights. In addition to the trauma caused to the victims of these crashes, signalised intersection crashes cost the community around \$665 million in 2008.

The current wet-film cameras use outdated technology that will soon be obsolete. The new safety cameras use digital technology and can be networked and maintained from a centralised location meaning that they are safer and more efficient to operate.

#### **How do the cameras work?**

The safety cameras operate automatically day and night. Safety cameras detect and record the speed of a vehicle by using vehicle tracking radar or electronic detectors that are embedded in the road's surface. These detectors accurately measure the speed of the vehicle. If the speed of the vehicle exceeds the speed limit then a digital picture is taken of the offending vehicle.

The red-light detection function of these cameras is connected to the traffic lights and is activated when a vehicle crosses the white stop line. The camera is programmed to take photographs of the rear of any vehicle travelling over the stop line or entering the intersection after the lights have turned red. The camera will not be triggered by vehicles crossing the stop line on amber or green lights.

#### **What does the camera record?**

If a vehicle is detected speeding or running a red light, a digital image of the vehicle is recorded which includes the registration plate of the vehicle. Safety cameras have the capacity to measure speed in both directions of travel.

[http://www.rta.nsw.gov.au/roadsafety/speedandspeedcameras/safetycameras/safety\\_camera\\_faqs.html](http://www.rta.nsw.gov.au/roadsafety/speedandspeedcameras/safetycameras/safety_camera_faqs.html)

**Question 25 continues on page 14**

Question 25 (continued)

- (d) (i) The old red light cameras use “wet film” technology where manual collection is required. The new safety cameras use digital technology. 3

Explain the advantages of this new digital technology compared to the old wet film technology in terms of transaction processing?

- (ii) Is the new technology of issuing infringement notices considered as a real-time or batch system? Justify your answer. 3
- (iii) Outline backup procedures suitable for this transaction processing system so that no data is lost in the event of a system failure. 4
- (iv) Discuss the impact of the use of this information system on the employees. 2

**End of Question 25**

**Question 26 – Decision Support Systems (20 marks)**

- (a) (i) Define a 'macro' in the context of spreadsheets. 1
- (ii) Explain how 'certainty factors' are used as a means of dealing with unclear situations. 2
- (b) (i) Describe how spreadsheets can be used to analyse trends and make predictions. 2
- (ii) Outline the structure of an expert system. 3
- (iii) Contrast the processing methods used by neural networks and expert systems. 3
- (c) Use the following information to answer part (c).

The Gold Coast City Council has developed a Flood Emergency Decision Support System for use by emergency managers. The system includes flood modelling capacity, properties, infrastructure and population data, which can be used to identify vulnerable population and determine the evacuation of the population at risk in post disaster situations. This decision support system has been made available for use via the Internet.

The Flood Emergency Decision Support System performs real-time flood predictions based on real-time data provided by the Bureau of Meteorology. The outputs of this decision support system are the people who need help, the best way to access these people, the best evacuation route as well as how much time is available to evacuate these people.

Source: The Australian Journal of Emergency Management, Vol. 24 No. 2, May 2009.

- (i) Identify whether this type of decision support system is best suited to a structured, semi-structured or unstructured situation and justify your answer. 2
- (ii) Compare the use of an expert system and a neural network in relation to the Flood Emergency Decision Support System. Provide a recommendation on which one would be best suited to be used for this system. 3
- (iii) Discuss the responsibilities of the emergency managers when using the Flood Emergency Decision Support System to manage a flood emergency. 4

**Question 27 – Automated Manufacturing Systems (20 marks)**

- (a) (i) Discuss the relationship between CAD and CAM in manufacturing systems. **3**
- (ii) In the context of an automated manufacturing system, explain the use of microprocessors. **3**

- (b) Nick's Solpan Company is a semi-automated company that uses continuous manufacturing to produce solar panels.

Nick's Solar Panel Production Line includes work stations as outlined below

- An automated soldering process for producing cell strings
  - An automated Solar Module Laminator
  - Solar Module Inspection station allowing for operators to conduct visual inspections after lamination.
- (i) Explain what continuous manufacturing is and why it would be suitable for producing solar panels. **3**
- (ii) Draw a block diagram to show detail of human and computer-controlled tasks. **4**
- (iii) The supervisor at Nick's Solpan Company has found noise is preventing the automated machines from working correctly. **3**
- In relation to Automated Manufacturing Systems, explain;
- What noise is
  - What causes noise
  - Ways of correcting noise
- (iv) Describe the operation of barcode readers and RFID tags and how they can assist in inventory tracking and production at Nick's Solpan Company **4**

### Question 28 – Multi-media Systems (20 marks)

- (a) Describe the technique of compression in relation to images and audio. Include ONE example of each. 3
- (b) Animators often use a process called tweening. Outline the importance of this technique for animators. 2
- (c) Discuss how hyperlinks control the *interactivity* of a multimedia system. 2
- (d) Storing and retrieving in multimedia systems is an important process. File formats are used to store different types of data including audio, images, videos and animations. 3

Copy and complete the table below, by identifying TWO file formats for each of the different types of data listed.

| Data Type | Identify TWO Examples of a File Format |
|-----------|----------------------------------------|
| Audio     |                                        |
| Images    |                                        |
| Videos    |                                        |

- (e) Describe TWO hardware devices used to create and display multimedia presentations. 2
- (f) A current and emerging trend in multimedia systems is the development and use of virtual worlds.

Examples of these would be the 3D Internet based multimedia presentations where subscribers can:

- style their own look
- create and decorate their own home
- go on adventures
- have special powers
- go shopping
- meet people and
- chat to other virtual world characters

- (i) Describe TWO advances in technology that have made the use of virtual worlds possible. 4
- (ii) Discuss THREE issues related to the responsible use of establishing a virtual world in an Internet environment. 4

**End of paper**

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### **EXAMINERS**

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