NSW Education Standards Authority

Information Processes and Technology

General Instructions
- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil

Total marks: 100

Section I – 20 marks (pages 2–8)
- Attempt Questions 1–20
- Allow about 40 minutes for this section

Section II – 40 marks (pages 9–12)
- Attempt Questions 21–24
- Allow about 1 hour and 10 minutes for this section

Section III – 40 marks (pages 13–17)
- Attempt TWO questions from Questions 25–28
- Allow about 1 hour and 10 minutes for this section

Section I

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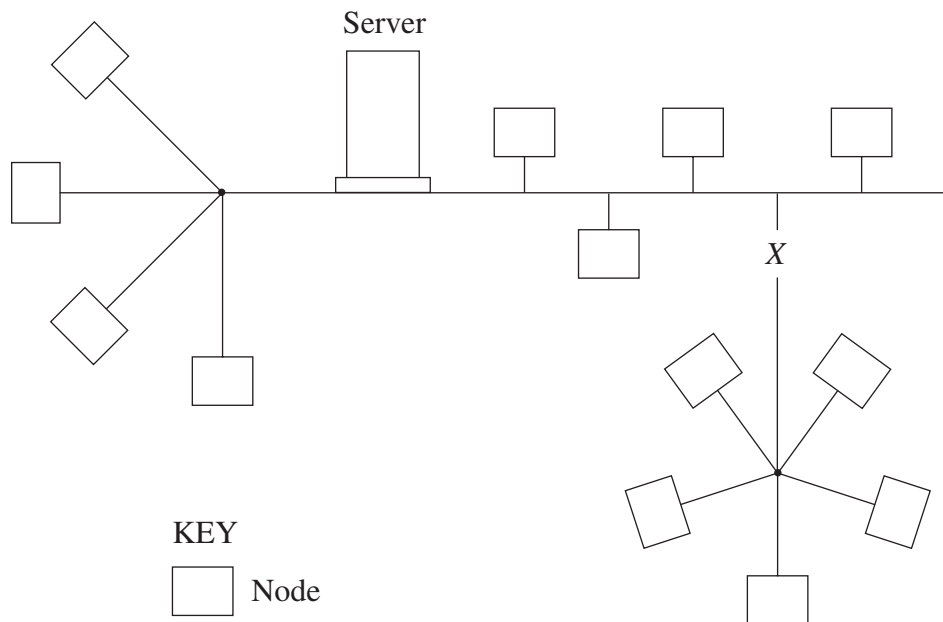**Allow about 40 minutes for this section**

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

1   Which project management tool can be used to inform team members how and when
    information will be distributed?

    A.   Scheduling of tasks

    B.   Journal to record progress

    C.   Diary to record dates of meetings

    D.   Communication management plan

2   Why are parity bits used in data transmission?

    A.   To check for errors

    B.   To convert data into a series of 0s and 1s

    C.   To count the number of 0s and 1s in a data packet

    D.   To direct data packets from their source to their destination

3   Which communication tool is used to manage a live newsfeed for a website?

    A.   Email

    B.   RSS

    C.   SMS

    D.   Wiki

4   Consider this piece of html code:

    <h2> Study IPT! </h2>

    Which part of the code is an example of metadata?

    A.   https://

    B.   Study IPT!

    C.   <h2> and </h2>

    D.   studymore.org.au/ipt.htm

5   Which development approach involves a small team of multi-skilled developers modifying a solution efficiently in a short period of time?

    A.   Agile method

    B.   Customisation

    C.   Prototyping

    D.   Traditional method

6   Which of the following best describes *smtp*?

    A.   A protocol for electronic mail transmission

    B.   A set of rules to securely transfer files across a network

    C.   A set of rules for securing communication between computers

    D.   A protocol used for synchronising communication across networks

7   A project manager creates an online survey form to obtain feedback from users about an information system. The feedback is entered into a spreadsheet.

Which combination of information processes is being carried out?

    A.   Organising, receiving, storing

    B.   Organising, processing, storing

    C.   Collecting, analysing, displaying

    D.   Collecting, organising, displaying

8   Chris wants to transfer a photo from his mobile device to Alex's mobile device but has no credit to make phone calls or send messages.

Which transmission medium should Chris use?

    A.   Bluetooth

    B.   Fibre optics

    C.   Satellite

    D.   Microwave

9   The purpose of handshaking in a communication system is to

    A.   transmit data between nodes.

    B.   determine the speed of data transmission between nodes.

    C.   detect and correct errors in data transmission between nodes.

    D.   establish and negotiate communication protocols between nodes.

Use the following information to answer Questions 10 and 11.

The following diagram shows a network.

KEY

☐ Node

10 Which topology is represented?

    A. Bus

    B. Hybrid

    C. Ring

    D. Star

11 Which hardware component is *X* most likely to be?

    A. Bridge

    B. Gateway

    C. Modem

    D. Repeater

12 Which of the following is used to document the purpose of a new system in terms of
    user and participant needs, the inputs and outputs of the new system and the information
    processes performed on the data?

    A. Data dictionary

    B. Data flow diagram

    C. Feasibility report

    D. Requirement report

13 At which stage in the development of a new system would a project team determine how data is to be converted?

    A.   Planning

    B.   Designing

    C.   Implementing

    D.   Testing, evaluating and maintaining

14 A car company uses its cars' inbuilt GPS systems to collect data about customers' driving patterns and stores it in a centralised database. The company intends to use this data and data on weather and road conditions to issue customers with personalised alerts.

Which of the following has the company used to analyse the data?

    A.   Data mining

    B.   Data retrieval

    C.   Data matching

    D.   Data warehousing

15 A government is trialling a new mobile camera system to find drivers who are using their mobile phone while driving. A city and a country location have been chosen for the initial trials and testing. The successful system will be rolled out across the state over the next year.

Which combination of conversion methods is being used?

    A.   Pilot and direct

    B.   Pilot and phased

    C.   Parallel and direct

    D.   Parallel and phased

16 A web spider crawls for key words, builds an index based on the key words and stores the data for user access.

Which tool best describes this process?

    A.   Search engine

    B.   Text searching

    C.   Hypermedia search

    D.   Uniform resource locators

Use the following information to answer Questions 17 and 18.

The diagram shows an entry form for a community fun run.

First name		
Last name		
Location of run	▼	
Gender	○ Female ○ Male	
Date of birth	_ _ ▼ _ _ ▼ _ _ _ _ ▼	
Email		
Emergency contact	04 _ _ _ _ _ _ _ _	─(X)
Please provide any medical conditions you have in case of emergency	▲ ▼	─(Y)
I accept the terms and conditions	○ Yes ○ No ─(Z)	

17   Which row in the table correctly identifies suitable screen elements for *X*, *Y* and *Z*?

	X	*Y*	*Z*
A.	Text box	Input mask	Check box
B.	Input mask	Text box	Radio button
C.	Text box	Input mask	Radio button
D.	Input mask	Text box	Check box

18   Which row in the table correctly identifies suitable data types for *X*, *Y* and *Z*?

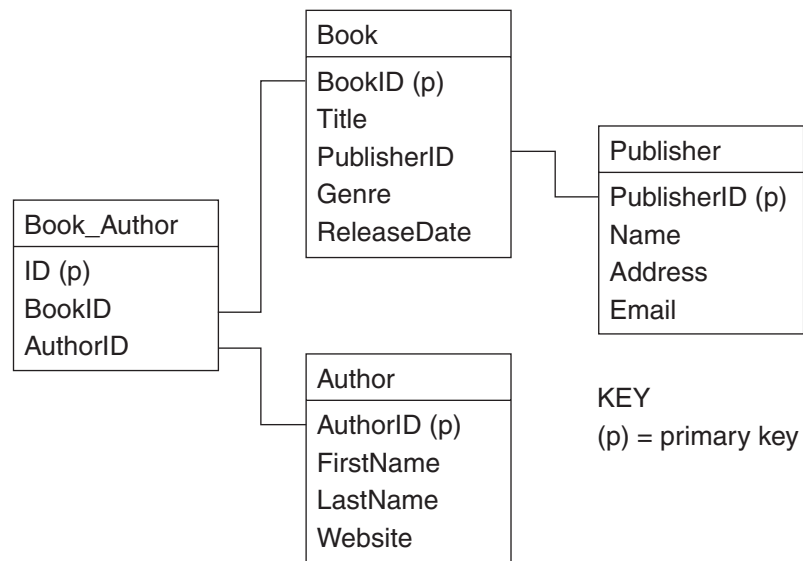|	*X*	*Y*	*Z*
A.	Number	Text	Boolean
B.	Real	Number	Text
C.	Text	Real	Text
D.	Text	Text	Boolean

– 6 –

19 A company has developed interview criteria for a management position. It uses the following decision table as the basis for determining which applicants will be considered for an interview.

Conditions	Rules							
Business degree	Y	Y	Y	Y	Y	Y	N	N
Five years minimum relevant experience	Y	Y	Y	Y	N	N	Y	N
Demonstrates communication skills	Y	Y	N	N	Y	Y	Y	N
Demonstrates teamwork skills	Y	N	Y	N	Y	N	Y	N
Actions								
Consider for interview	Y	N	N	N	Y	N	N	N
Reject applicant	N	Y	Y	Y	N	Y	Y	Y

Which of the following statements is true of applications to be considered for an interview?

A. The applicant has a business degree and demonstrates communication skills only.

B. The applicant has a business degree, and demonstrates communication and teamwork skills.

C. The applicant has a business degree, five years minimum relevant experience and demonstrates teamwork skills only.

D. The applicant has a business degree, five years minimum relevant experience and demonstrates communication skills only.

20 A database has been designed for an online bookstore. The following diagram shows tables identified in the database.

Book
BookID (p)
Title
PublisherID
Genre
ReleaseDate

Publisher
PublisherID (p)
Name
Address
Email

Book_Author
ID (p)
BookID
AuthorID

Author
AuthorID (p)
FirstName
LastName
Website

KEY
(p) = primary key

Which row in the table shows the relationship between the Book and Book_Author tables, Author and Book_Author tables and Book and Publisher tables?

	Book and Book_Author	*Author and Book_Author*	*Book and Publisher*
A.	One to many	One to one	Many to one
B.	Many to one	One to one	One to many
C.	One to many	One to many	Many to one
D.	One to one	Many to one	One to many

Section II

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

Answer each question in the appropriate writing booklet. Extra writing booklets are available.

If you include diagrams in your answer, ensure that they are clearly labelled.

Question 21 (8 marks) Use the Question 21 writing booklet.

A dental care centre is introducing a new online appointment booking system accessible via its website. The online appointment form allows patients to book appointments by selecting the type of treatment, dentist, date and time. This data is stored in a relational database. Confirmation of the appointment is then sent electronically.

(a)   What information technology is required for the system?   **2**

(b)   Justify a suitable messaging system to be used for the confirmation of   **3**
      appointments.

(c)   Describe how the system can create a report that displays the daily appointments   **3**
      for ONE dentist.

Question 22 (10 marks) Use the Question 22 writing booklet.

An events management company organises a two-day music festival each year. Customers can select a child, an adult or a family ticket, one-day or two-day tickets, camping or no camping. A discount is given to customers who purchase their tickets in advance. Customers are sent a festival card which enables them to access the festival and camping areas.

In 2018, the events management company is introducing a cashless payment system. Prior to the music festival customers will be able to transfer money from their bank account to the festival card electronically. Whenever a customer presents their festival card to make a purchase, details such as items purchased, amount, vendor (merchandise, food, drinks), time and date are collected.

(a)   Draw a context diagram to represent the booking system.   **3**

(b)   Describe how the events management company can use data gathered from this   **3**
        event.

(c)   Explain potential issues relating to the use of electronic banking for both the   **4**
        events management company and the customers.

Question 23 (11 marks) Use the Question 23 writing booklet.

A restaurant chain employs a project manager and development team to update its website and build a mobile device application to provide an online ordering system.

(a) Describe TWO communication skills the project manager needs in order to communicate with the restaurant chain and the development team members. **3**

(b) The following tasks have been identified for the development of the online ordering system. **3**

Task description	Duration (weeks)
Requirements gathering	2
Technical benefit study (This will follow the requirements gathering)	2
Design and refine interface (This can begin one week into the technical benefit study)	3
Build and test (This will begin in the final week of the design and refine stage)	3

Create a Gantt chart showing the minimum time required to complete the tasks described.

(c) Explain why secure sockets layer (SSL), transmission control protocol (TCP) and internet protocol (IP) are used after a customer places an order via the mobile device application. **5**

Question 24 (11 marks) Use the Question 24 writing booklet.

A project team has been contracted by a company to develop a bushfire detection system to sense, locate and track bushfire smoke and monitor weather conditions such as temperature and wind direction. As part of the project, a prototype is developed.

A network of sensor nodes placed 100 m apart is located in the bushland. The nodes communicate with each other while sampling the air to detect bushfire smoke in the immediate area.

The central command centre monitors each sensor node to locate the source of a bushfire, sending instructions to emergency services.

(a) Describe the benefits of creating a prototype for this system. **3**

(b) Explain why live data should be used to test the bushfire detection and monitoring system. **3**

(c) Suggest and justify suitable transmission media for each of the following: **5**

   • between sensor nodes
   • from the central command centre to the sensor nodes
   • within the central command centre.

Section III

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

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

If you include diagrams in your answer, ensure that they are clearly labelled.

Question 25 — Transaction Processing Systems (20 marks)
        Use a SEPARATE writing booklet.

(a)   What are the limitations of batch processing? **2**

(b)   How do web-based and non-web-based transaction processing systems differ? Give an example of each. **3**

(c)   Explain how a transaction processing system and a management information system can work together in an organisation. **3**

(d)   A local coffee shop has implemented a virtual ordering and payment system. Customers pre-order their coffee using a mobile application (app) before collecting their coffees from the shop. **4**

        Describe the advantages and disadvantages of this online ordering system for both the customers and the employees of the coffee shop.

(e)   A company is developing a new short-term bicycle sharing system.

        The new system will have a centralised hiring system. To hire a bicycle customers will be required to create an account. Each customer using the bicycle sharing app will scan the barcode on the selected bicycle to record the location of the bicycle and the time of hire. A code is then sent to the customer's mobile device to unlock the bicycle.

        When customers are finished with the bicycle they rescan the barcode to end the hiring session. The data is kept in a transaction log and the hiring fee is then debited from the customer's nominated bank account at the end of the month.

     (i)   Describe the purpose of the transaction log in this system. **3**

     (ii)   Explain the importance of data security, data integrity and data quality in this system. **5**

Question 26 — Decision Support Systems (20 marks)
Use a SEPARATE writing booklet.

(a) What is the purpose of certainty factors in an expert system? **2**

(b) How does online analytical processing support decision making in a decision support system? **3**

(c) A national retail chain requires its regional managers to travel to its head office once a month for a planning meeting. **3**

Explain how a group decision support system (GDSS) could be used to improve this process.

(d) This spreadsheet shows part of a brochure delivery payment system. Each employee is allocated 1500 brochures to deliver. Different bonus rates are paid to employees based on the percentage of brochures returned. **4**

Design formulae for cells C9, D10 and E11.

	A	B	C	D	E	F
1		**Brochure Deliveries Payment**				
2						
3	**Month**	January				
4	**Brochure Allocation**	1500				
5	**Pay Rate**	$0.85				
6						
7	**Employee**	**Delivered**	**Percentage Returned**	**Bonus Rate**	**Payment**	
8	Jane Watson	1200	20%	$0.45	$1,560.00	
9	Jannet Ho	750		$0.25	$825.00	
10	Hailey Slacik	1125	25%		$1,350.00	
11	James Wittman	350	77%	$0.00		
12						
13			**Percentage Returned**	**Bonus Rate**		
14			0%	$0.45		
15			25%	$0.35		
16			50%	$0.25		
17			75%	$0.00		
18						

Question 26 (continued)

(e)   A company is developing a new short-term bicycle sharing system.

The new system will have a centralised location system that will make use of geographical information technology. The company's interactive hiring application (app) provides customers with information to locate the nearest available bicycle. The app opens with a map of the customer's current location. Customers select an icon to zoom in to their location to get up-to-date information including location of bicycles available, walking route and time to the bicycle.

  (i)   How does a geographical information system (GIS) support decision   **3**
        making in the system's centralised location system?

  (ii) Explain the data/information requirements for the new system in terms   **5**
        of collecting, organising and analysing.

End of Question 26

Please turn over

Question 27 — Automated Manufacturing Systems (20 marks)
Use a SEPARATE writing booklet.

(a) What is the purpose of critical damping in an automated manufacturing system? **2**

(b) Describe the effects of de-skilling on participants as a result of working in an automated industry. **3**

(c) Distinguish between human-centred and machine-centred automated manufacturing systems. In your answer, include an example of each. **3**

(d) A local farmer is using a remote-controlled aerial vehicle (drone) with advanced imaging capabilities to view crop damage. **4**

The farmer uses joystick controls while sitting at a computer to control the drone which is flying over the crops.

Describe how both a stepping-motor and the microprocessor in the joystick operate while flying the drone.

(e) A company is developing a new short-term bicycle sharing system.

The new system will have a centralised production system that will make use of automated manufacturing. It will include automated spray-painting and assembly of the bicycle. The bicycle will be fitted with solar power rear and front lights and a smart locking system. The lights and the smart locking system make use of temperature, motion and light sensors. The bicycle lights can also be powered by energy generated while riding.

   (i) Describe how sensors are used when the bicycle is being ridden. **3**

   (ii) Explain how quality can be consistently maintained in the manufacturing of the bicycles. **5**

Question 28 — Multimedia Systems (20 marks)
Use a SEPARATE writing booklet.

(a)   Why is the integrity of the source data important in developing a multimedia product?   **2**

(b)   How do path-based and cel-based animation differ? In your answer, include an example of each.   **3**

(c)   Explain why the roles of a project manager and technical support staff are important in the development of a multimedia product.   **3**

(d)   A sporting club is developing an interactive multimedia blog, which will include videos of games, image galleries and a social media feed.   **4**

Describe the software required to create this interactive multimedia blog.

(e)   A company is developing a new short-term bicycle sharing system.

The new system will have a centralised multimedia information system. The bicycle hiring application (app) will have an interactive user guide to provide customers with visual, audio and video instructions about the hiring process including using the bicycle, hiring, payment, promotions and coupons.

   (i)   Explain why the interactive user guide can be considered an information kiosk.   **3**

   (ii)   Explain the data/information requirements for the new system in terms of displaying, processing, and storing and retrieving.   **5**

End of paper

BLANK PAGE

BLANK PAGE

BLANK PAGE