

## Marking Schemes

This document was prepared for markers' reference. It should not be regarded as a set of model answers. Candidates and teachers who were not involved in the marking process are advised to interpret its content with care.

### General Notes on Marking

1. Teachers are strongly advised to conduct their own internal standardisation procedures using the marking scheme before the actual marking begins. After standardisation, teachers should adhere to the marking scheme to ensure a uniform standard of marking within the school.
2. The marking scheme may not exhaust all possible answers for each question. Teachers should exercise their professional discretion and judgment in accepting alternative answers that are not in the marking scheme, but are correct and well- reasoned.
3. The following symbols are used:

- |   |                                                                                                                                                |
|---|------------------------------------------------------------------------------------------------------------------------------------------------|
| ✘ | This symbol indicates a wrong or unacceptable answer.                                                                                          |
| ■ | Shaded words, figures or ideas are not essential for the candidate to be awarded the point.                                                    |
| / | A single slash indicates an acceptable alternative within an answer.                                                                           |
| + | A plus sign indicates that there are two pieces of information and the second part will be awarded points only when the first part is correct. |

4. In questions asking for a specified number of reasons or examples etc. and a candidate gives more than the required number, the extra answers should not be marked. For instance, in a question asking candidates to provide two examples, and if a candidate gives three answers, only the first two should be marked.

**Paper 1 (Section A)**

<b>Question No.</b>	<b>Key</b>	<b>Question No.</b>	<b>Key</b>
1.	C (57%)	21.	A (61%)
2.	C (66%)	22.	D (64%)
3.	D (37%)	23.	A (73%)
4.	D (32%)	24.	C (68%)
5.	A (79%)	25.	D (78%)
6.	D (91%)	26.	A (93%)
7.	D (81%)	27.	B (83%)
8.	B (57%)	28.	C (77%)
9.	D (64%)	29.	B (51%)
10.	A (68%)	30.	C (38%)
11.	A (59%)	31.	C (41%)
12.	B (38%)	32.	C (71%)
13.	C (57%)	33.	B (59%)
14.	B (55%)	34.	B (71%)
15.	D (73%)	35.	D (86%)
16.	A (57%)	36.	C (90%)
17.	D (50%)	37.	A (78%)
18.	C (80%)	38.	B (69%)
19.	B (71%)	39.	B (81%)
20.	C (60%)	40.	A (79%)

*Note: Figures in brackets indicate the percentages of candidates choosing the correct answers.*

**Paper 1 (Section B)**

	<b>Marks</b>
1. (a) Faster seek time / shock resistance / lighter in weight / less heat produced during operation / less power consumption / smaller in size  ✗ more silence in operation (not related to the scenario)	1×2
(b) RAM temporarily stores user programs / data Increasing the size of RAM can decrease time needed to access the secondary storage devices.	1 1
(c) (i) Method 1: Updated functions are provided. / No installation is required. / The word processor can be used on any other computer.  Method 2: No Internet connection is required. / More functions can be provided.	1  1
(ii) Not compatible with the operating system Not enough storage space	1×2
(d) (i) Cross check with different sources Check from authoritative sources. Check the date/time of the publication.	1×2
(ii) Acknowledge/identify/label the source. Get consent from provenance. Pay for the usage. Use Open Source/copyleft/Creative Commons (CC) information and images.	1×2

2. (a) `=if(C2<=C$102,1,0)` or `=if(C2>C$102,0,1)` 2  
 ① `if( , , )`  
 ① all correct  
 ✗ `≤`
- (b) `=D2*E2+E$102` 1
- (c) COLUMNS StudID 1  
 VALUES sum of Score / sum (Score) 1, 1  
 ① use of sum  
 ① Score/score
- (d) (i) StudID + Book code 1  
 (ii) S01 10 2  
 S03 7  
 ① group by + where  
 ① sum + select + other fields
- (e) chart type 1  
 title, legend, axis title, axis label, data label (any 2) 1×2

3. (a) (i)  $A[i] \leftarrow A[i-1]$   
 $A[i-1] \leftarrow \text{TEMP}$  1
- (ii) First iteration: 

A[0]	A[1]	A[2]	A[3]	A[4]
3	4	1	8	6
i:1	j:2			

1
- Second iteration: 

A[0]	A[1]	A[2]	A[3]	A[4]
3	4	1	8	6
i:2	j:3			

1
- Third iteration: 

A[0]	A[1]	A[2]	A[3]	A[4]
3	1	4	8	6
i:1	j:3			

1
- (b) Set 1: 0      Set 2: 10 1, 2
- (c) i will never be smaller than 0. 1
- (d) Test 1: It contains negative values / zero. 1×2  
 Test 2: It is sorted / unsorted / normal / standard data.  
 Test 3: It contains duplicate values.

4. (a) (i) Twisted pair cable 1×2  
 Unshielded Twisted Pair cable / UTP  
 Shielded Twisted Pair cable / STP  
 fibre optics / fiber optics / optical fiber  
 Coaxial cable  
 ✕ Network cable/ TP
- (ii) He would like to form one single network. / 1  
 Connect all the devices used in his toy shop that a switch is used to connect devices and help one device communicate with another devices.  
 ✕ port
- (b) Benefit: Access to worldwide markets / anytime 1  
 ✕ Improve competitiveness / minimal sales cost (with explanation)
- Drawback: No face-to-face interaction/ Additional cost on building web servers 1
- (c) (i) Digital Cert/ SSL/ TLS/ e-cert 1  
 ✕ domain name
- (ii) Public key: customers/ users 1  
 Private key: David 1
- (d) (i) Add a parity bit for checking / use checksum / 1  
 Transmit two times to check the consistency of data.  
 ✕ validation check
- (ii) 10 10 01 10 10 2  
 ①
- (iii) The design of the machine can be simplified / 1  
 Fewer commands are implemented /  
 The performance is better due to the simple and limited number of commands /  
 The response will be faster as the CPU on the robot does not have to decode too many bits at a time /  
 The instructions will be transferred and processed faster when controlling the robot  
 ✕ smaller storage space is needed

5. (a) (i) Smart card is more secure than QR code. / 1  
Smart card is harder to replicate while QR code can be replicated more easily.
- (ii) Using QR code is cheaper (lower cost) / 1  
It is easier to implement (manufacture) QR code
- (iii) More / additional functions can be provided in the mobile application. 1  
(e.g. View profile, records of the use of fitness centres, check the validity of membership, amend Personal Data.) /  
No need to carry the card.
- (b) (i) It is a batch processing system as 1  
- data is recorded and collected over a period of time and uploaded to the server.  
- it contains continuously gaining a total amount of data and upload the date file at a single log.  
- it does not process up-to-date data but process data once every 5 minutes  
- data is transferred periodically but not immediately.
- ✗ it is scheduled to upload data every 5 minutes.
- (ii)  $200 \times 2 \text{ KB} / 10\text{Mbps}$  ① 1 + 1  
=  $200 \times 2 \times 1024 \times 8 \text{ b} / 10 \times 1000000 \text{ b/s}$   
= 0.33s  
Acceptable answer: 0.33s / 0.32768s / 0.328s
- (iii) - Security problem e.g. eavesdropping 1 × 2  
- Unstable connection
- (c) (i) There is interference from the environment. / 1  
Too many members view the lessons at the same time, and the network traffic becomes very heavy.
- (ii) The delivered message can be edited before broadcasting. / 1  
Subtitles can be inserted. /  
It can be viewed at any time or multiple times. /  
It can be viewed in offline mode or without an Internet connection.
- ✗ Members can choose lessons they want to attend.  
✗ Watch the video with friends later.
- (d) The email comes from a .com domain which is commercial / 1  
The email does not come from a .gov domain
- Users will be directed to phishing web site after clicking the link. 1  
Other reasonable answers:  
Triggering the download of malware to the device  
Downloading and installing malware, resulting in the leakage of personal information  
Getting infected with ransomware  
Triggering the download of a virus into his computer or network

Paper 2A

Marks

1. (a) SELECT MID } ①  
 FROM MEMBER }  
 WHERE MTYPE = 'S' AND POINT > 20 }  
 ORDER BY JDATE DESC } ①

(b) SELECT DISTINCT MID ① 2  
 FROM BOOKING  
 WHERE BDATE BETWEEN '01/09/2022' AND '30/09/2022' ①

(c) SELECT MID, JDATE 2  
 FROM MEMBER  
 WHERE MID NOT IN ( SELECT MID FROM BOOKING )  
 ① ①

Alternative: use outer join

(d) SELECT C.CID  
 FROM BOOKING AS B , CENTRE AS C } ①  
 WHERE ~~C.CID = B.CID AND~~ BDATE ='30/09/2022'  
 GROUP BY C.CID ① (C.MNAME)  
 HAVING COUNT(B.BID) > 500 ①

Optional when using MNAME

(e) (i) To show who have referred members and the total number of referred members they have 2  
 ① ① (count)

(ii) MEMBER 1  
 POINT POINT + 10 1

(iii) MEMBER 1  
 V1 1



2. (a) 2 1×3  
6  
1

(b) Data type 1

Primary key / not null / mandatory / length / range 1×2

(c)

Class:

Class no:

Student id:

Year:

1<sup>st</sup>choice:

2<sup>nd</sup>choice:

3<sup>rd</sup>choice:

Display personal information (Class, Class No, Student ID) 1×5

Display last year elective (Popularity)

Choose different electives and identify the sequence of choices of elective as 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> priority

Submit button (save, confirm)

Overall completeness (UI, user-friendliness)

(d) 4

Database object	Student 1		Teacher	
	Read	Write	Read	Write
view 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
choice 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ELECTIVE			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

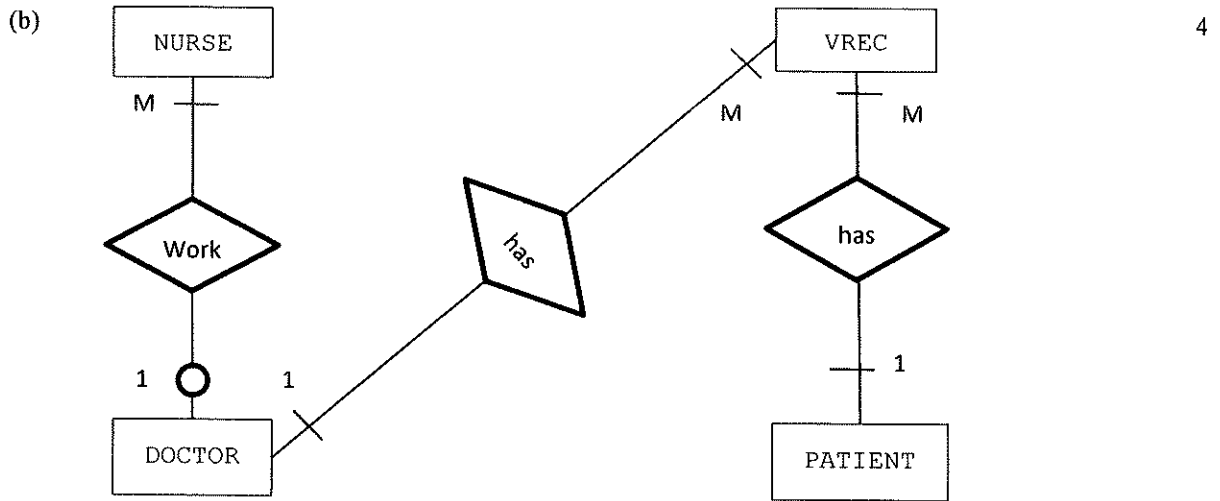
①

①, ①

①

Student 1 Choice 1 (Read optional)

3. (a) NOOFVISIT  
 There is no need to calculate the number in real time / the number every time 1+1

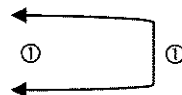


Cardinality: ① × 2  
 1-M, 1-M ①, ①  
 Relationship ①  
 4 out of 5

(c) Primary key: NID in NURSE may be the same as DID in DOCTOR 1+1  
 Attribute: There is a mismatch of attributes (01 in DEPNO in DOCTOR vs S01 in DEPNO in NURSE) 1+1  
 Field issue: There are four fields in NURSE while there are three fields in DOCTOR  
 Identity: Identifying the identity of NURSE and DOCTOR may not easy

Set a new field as the primary key in merged table instead of using NID or DID.  
 Ensure consistent data types and lengths for DEPNO in the merged table.  
 Create a new table to store the relationship between DOCTOR and NURSE, as DID will not be one of the fields in the merged table.  
 Add 1 column to the merged table to identify whether a record belongs to DOCTOR or NURSE.

(d) (i) Retrieve data from NURSE and DOCTOR. 2  
 Consolidate/message/reformat the data as needed. ①  
 Store the data in STAFF. ①



(ii) Update data (DID) in VREC. 1

(iii) DELETE: Delete records inside the table. 1  
 DROP: Remove the whole table. 1

4. (a)	MID		1
	TN	CTYPE	1, 1
(b) (i)	COUNT (*)	(other appropriate field)	1
(ii)	CREATE INDEX SHOWTIME	①	2
	ON TINFO (CID, MTIME)	①	
(iii)	Searching is more efficient / can be done in a shorter time.		1
(c)	MNAME		1
	CID, CTYPE		1
	CID		
	CID, SNO		1
	MTIME + CID + SNO	(① any two)	2
	CID references CID of CINEMA		1
(d)	Data encryption		1 × 2
	system security: set access rights		
	(other technical methods such as firewalls and antivirus programs)		

1. (a) Database server: Its network (192.168.21) is different from the other servers (192.168.20). 1  
 DHCP server: Its IP address includes 256 and it is not a valid IP address. 1
- (b) All devices belong to the same network. When streaming broadcasting is performed, it can cause severe congestion in the network due to limited switch capacity or limited bandwidth of the network cables, leading to a slowdown in other network communications. 1, 1
- (c) (i) A router uses IP addresses to determine the routing path. 1

(ii)

Usage	IP address range		Subnet mask
	From	To	
Student network	192.168.20.1	192.168.20.126	255.255.255.128
Staff network	192.168.20.129	192.168.20.254	255.255.255.128

1, 1, 1

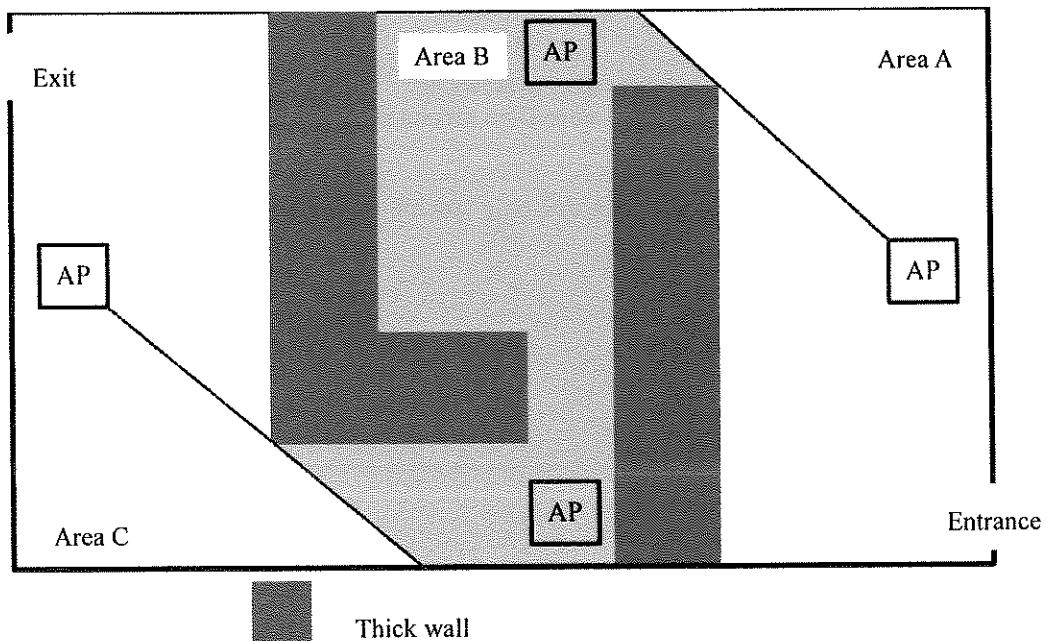
Correct IP address : @ 1

Correct Subnet mask : 1

- (iii) 192.168.20.255 1
- (iv) ~~128-2-45-4 = 77~~ 1
- (d) (i) Subnet mask / Default gateway / IP address of the DNS server 1×2  
 (other reasonable answer)
- (ii) It is because they are in different subnets. 1
- (iii) The dynamic IP addresses may be updated after system reboot. 1  
 As a server, other computers access it through a specified IP address.  
 Changing the IP address will prevent other computers from reconnecting to the server. 1

2. (a) Network engineer: Plans, builds, designs, and troubleshoots networks. 1×2  
 Network administrator: Performs daily network maintenance tasks such as updating network equipment, configuring servers and performing backups.
- (b) (i) Researchers can connect from anywhere within the coverage area. 1×2  
 The park does not need to set up and maintain its own network equipment.
- (ii) Greater coverage range / Less restricted by geographic environment. 1
- (c) (i) No, as the rule (rule number 2) intercepts access to the database server via the Internet through 210.0.205.235. 2
- (ii) Yes, as the web server can directly access the database server without going through the firewall. 2
- (iii) Can, as computer B is allowed to access the Internet via 210.0.205.236 according to the rule (rule number 3). 2
- (d) Advantage: Domain names are easier to remember. 1  
 Disadvantage: It cannot be used when DNS servers experience failures. 1
- (e) Use digital certificates to ensure that only specific trusted computers can access the database server. 1×2  
 Two-way authentication

3. (a) As long as they are within the range, they can read the labels. / Multiple labels can be read at the same time. 1
- (b) Staff accounts: Set folder permissions to allow both reading and writing, ensuring the ability to read and save files. 1  
Tourist accounts: Set file permissions within the folder to read-only, ensuring that files can only be read. 1
- (c) It is not necessary to rely on computer P. / Printers have higher mobility. / There are fewer technical connectivity restrictions. / It is easier to connect. 1×2
- (d) (i) WPA2 is more secure. 1
- (ii) 1, 1



By adding two additional APs, it will extend the coverage to areas that were previously not covered by the existing APs.

- (iii) Change the channel to 2.4 GHz 1
- (iv) It will not be unable to connect due to the number of connections exceeding the maximum allowed by the AP. 1×2  
You can increase the allocated bandwidth for each connection.  
Even if some APs fail, the museum can still provide limited service.
- (e) (i) In the first and second month, all content is backed up in the first month, while only the updated content of the second month is backed up. 1
- (ii) It saves storage space and reduces backup time. 1
- (iii) When restoring, it must be sequentially restored from the first month to the third month. However, due to an issue with the backup in the second month, only the data from the first month can be restored at most. 1, 1

4. (a) Lower power consumption / Lower interference / Easier connectivity / Certified 1×2
- (b) (i) 1 1
- (ii) If the number of errors in the data is even, parity checking cannot detect them. 1  
Parity checking cannot detect the positions of errors, so it cannot be corrected in real-time at the receiving end.
- (iii) 0110 1  
1001 1
- (iv) If the data contains multiple error bits, the checksum can still detect them. 1
- (c) (i) Represents the source and destination addresses of the transmitting data packet. 1×2  
Provides clock information for synchronous transmission.
- (ii) Data packet B. 1  
Because the data packet has a larger payload, a smaller number of data packets are needed to transmit the same data, resulting in fewer headers. 1
- (d) (i)  $(4 / 200) \times (8 + 200)$  2  
 $= 4.16 \text{ MB}$
- (ii)  $= 4.16 \text{ MB} / 3 \text{ Mbps}$  2  
 $= 4.16 \times 1024 \times 1024 \times 8 / (3 \times 1000 \times 1000)$   
 $= 11.6 \text{ s}$   
Only the equation is correct. ①

Paper 2C

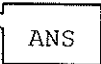
	Marks
1. (a) (i) Advantage: Able to capture a wide range of colours and gradients Simple to edit by changing the pixels Good for storing high quality images (it should be specified what constitutes 'high quality' to avoid receiving a 0 mark)	1
Disadvantage: larger file size poor scalability	1
(ii) Line art, such as logos, requires scalable graphics that can be resized. (icons, typography and lettering designs, patterns, and digital illustrations) (This answer should provide some description of line and shape to avoid receiving a 0 mark.)	1
(b) (i) JPG: shorter upload / download time (smaller file size) RAW: better image quality (no compression) (It should be specified how the quality is improved to avoid receiving a 0 mark.)	1, 1
(ii) Bluetooth / email / cloud storage ✗ FTP	1
(c) (i) Some data will be removed due to lossy compression.	1
(ii) $8 \times 1024 \div 512$ $512 \div 8 \times 1024$ = 16:1                                      = 1:16	1 1
(d) (i) $1080 \times 1920 \times 24 \times 30 \times 20$ (1) $\div 8$ (0 mark for ' $\times 8$ ') = 209 GB (208.57) or 224 GB (223.95)	1 1
(ii) $(5 \times 1024 \times 1024 \times 1024) \times 8$ $\div$ $(600 \times 1000 \times 1000)$ = 72 s (71.58) or 67 s (66.67) ✗ 68 s (68.3) ( $5 \times 1024 \times 8 / 600$ )	1 1
(iii) There will be black strips on the left and right sides of the video. / The video is distorted due to the different screen sizes.	1
Use video editing software to correct the aspect ratio of the video. / Rotate the resolution setting of the TV / Shoot the video with the correct resolution.	1
✗ Rotate the video 90 degree ✗ Stretch the video to fit the screen	



2. (a) AAC, MP3, WAV 2  
 ② 3 correct answers  
 ① 3 correct answers with 1 or 2 incorrect answers  
 ① 2 correct answers with 1 incorrect answer
- (b)  $\frac{44.1 \times 1000 \times 16 \times 4 \times 3 \times 60}{8 \times 1024 \times 1024}$  MB 1  
 = 61 MB (60.56 MB) 1  
 or  
 $\frac{44.1 \times 1000 \times 16 \times 4 \times 3 \times 60}{8 \times 1000 \times 100}$  MB  
 = 64 MB (63.5 MB)
- (c) Advantage: 1  
 Preserve the format of the text. (e.g. font) / prevent wrong character encoding
- Disadvantage: 1  
 It is not accessible for visual-impaired people (the text cannot be recognised by machine)./  
 The content cannot be identified by search engines.  
 Slower loading time (larger file size)
- (d) Fast forward / backward /scrolling / speed 1×2  
 Next song / Repeat / Random / Loop  
 Lossless audio (audio quality) / Karaoke version / Mode / Number of channels /Equaliser  
 ✕ Bitrate
- (e) (i) Organisation of paging 1×2  
 (e.g. font size / distance of page numbers / previous page button / input box for page number)  
 Number of entries each page  
 ✕ Alignment
- (ii) Category: Filtering songs, types of singers, language, etc. 1×3  
 Sorting: Popularity, length, publishing date, song name, etc.  
 Searching: Keyword, singers, tag, etc.  
 History  
 Favorite Songs
- (iii) Reduce the display size 1×2  
 Adjust the aspect ratio of the screen  
 Simplify the layout of the web pages  
 Reduce the resolution of the images  
 The input field should be suitable for mobile devices  
 Remove unnecessary multimedia elements  
 Build a text-only version  
 Make the font adjustable

3. (a) Concept: The domain has been registered. 1  
 For example, the desired domain name has been registered by others.
- Concept: Non-educational / Not a school 1  
 For example, the business type is not education but commercial, so that the authority will not allow such a registration request.
- × DNS failure.
  - × The IP address is not in Hong Kong.
- (b) (i) No + concept of subdomain / host / third-level domain 1  
*concert.onlineticketing.com* and *onlineticketing.com* belong to the same domain  
 she can create a subdomain or host in *onlineticketing.com*  
*concert.onlineticketing.com* belongs to *onlineticketing.com*
- (ii) Yes, but she needs to register *onlineticketing.com.hk* again. 1  
 No, she has not registered this domain. /  
 No, *onlineticketing.com.hk* does not belong to *onlineticketing.com* . /  
 No, *onlineticketing.com.hk* and *onlineticketing.com* are different domains.
- (c) (i) Concept of encryption: 1  
 • Data is encrypted in data transfer  
 Concept of authentication/identity:  
 • Web site identity is authenticated by a CA.  
 • The identity of the web site is real or can be verified.
- × Avoid hacking
- (ii) Payment (e.g. provide credit card data), user logon, 1  
 or other reasonable application in Mary's web site that requires encryption of sensitive data for protection  
 × SSL encryption (Not an application)  
 × The bank web site (Not relevant to Mary's web site).  
 × E-government (Not relevant to Mary's web site).

- (d) (i) Appropriate use of text field, radio button, check box, dropdown menu  
Input control limited to 9 data items listed in the table.  
The control is used to reduce input errors. 1×4
- Text field:
- Give suggestions while the user is inputting the text in the textbox.
  - ✗ Text field for keyword search without any error controls.
- Radio button:
- Provide options for single selection to avoid invalid input.
- Check box:
- Provide options for multiple selections to avoid invalid input.
- Dropdown menu: Event ID, Date (Year, Month and Day), Time, Venue, District
- Provide a menu for single/multiple selections to avoid invalid input
  - ✗ Input control for data not in the table (e.g. price)
  - ✗ Irrelevant input controls (e.g. calendar)
- (ii) 1
- Provide a route to the venue.
  - Suggest an event that is near the location.
  - Include other features related to using the user's current location for providing ticketing services.
  - ✗ Provide suitable language (User's IP address can be used instead).
- (e) 1×2
- Record the user's preference to give good suggestions for concerts or shows.
  - Record the user's preference to provide tailored-made settings.
  - Save the login session to allow users to access without logging in again (revisit).
  - Store the shopping cart information to facilitate payment.
- (f) 1
- For the visually-impaired:
- Provide audio descriptions of videos or visual appearances.
  - Includes ALT attribute/text descriptions of videos for screen reader / text-to-speech programs
- For the hearing-impaired: 1
- Include subtitling in the videos.
  - Include sign language.

4. (a) Client-side script: 2  
 It displays the change of icon when toggling it. ①  
 This change is instant, and no further action is required on the server side. ①
- Server-side script: 2  
 It sends the toggle action to the server to store ① and push ① this information to update all clients regarding the number of people who liked this game.
- (b) (i) Motion/Classic Tween ① 3  
 This tweening requires 3 key frames. ①  
 The frames in between of two keyframes are generated by algorithms. (auto-tweening) ①
- (ii) 60 frames (or 61) 1
- (c) 1 TO 5 1  
 ANS K 1, 1  
 ST GETLET (INP, K) 1, 2  
 ①  ANS  
 ANS 1

Paper 2D

Marks

1. (a)  $C \leq 5$   
 $C+1$

1  
 1

(b) (i)

i	1	2	3	4	5
L[i]	Cheese	Beef			

1, 1

Only Cheese and Beef left ①  
 correct positions ①

(ii)  $L[j] \leftarrow L[j+1]$   
 $C \leftarrow C - 1 / C \leftarrow j - 1$

1  
 1

(c) (i)

Bread
Beef
Onion
Bread

S

2

Bread at the top and bottom slots ①

(ii)

i	1	2	3	4	5
L[i]	Lettuce	Tomato	Beef	Bread	Bread

2

Bread at the last 2 slots ①

(d) (i)

	i	1	2	3	4	5
	R[i]	Onion	Mushroom	Tomato		

Fish  
 S

2

S ① R ①

(ii) B, pop(S)  
 B is not empty. / The queue/array is not empty. / C is not 0.  
 S, deq(B)

1  
 1  
 1

(B could be another variable name.)

2. (a) (i) 24 1
- (ii)  $4^j - 2^j$  1
- (b) (i)  $i \% 2 = 1$  1  
 $i \text{ mod } 2 = 1$   
 $i \% 2 \neq 0$   
*i is odd*  
*i is not even*
- $5*i - (j-1)$  1, 1  
 $5*i \oplus -j+1 \oplus$
- (ii) return roundup (num ÷ 5) 1, 1
- has identified num ÷ 5  $\oplus$   
correct expression  $\oplus$
- Checking:  
correct for 30  $\oplus$   
correct for 24 & 26  $\oplus$
- (iii) left <= right 1  
left  $\leftarrow$  m + 1 1  
right  $\leftarrow$  m - 1 1
- (c) (i) Better efficiency: fast and memory-efficient code 1  
Improved control: direct control over hardware for optimised programs  
Enhanced access: direct access to hardware features and devices
- (ii) A linker combines/links the object code and/or libraries to obtain executable code. 1, 1

(d) Phased conversion

1

**Reduced risk:** Phased conversion allows organisations to test the new system before fully implementing it, minimising the risk of errors or downtime.

**Gradual implementation :** Phased conversion allows the organisation to phase in the new system gradually, rather than implementing it all at once.

**Increased user acceptance:** Phased conversion allows users to become familiar with the new system incrementally, which can lead to increased acceptance and satisfaction with the system.

**Easier training:** Phased conversion makes it easier to train users on the new system since they are only required to learn new functionality incrementally.

Direct cutover conversion

1

**Cost:** Direct cutover conversion can save costs for the conversion process.

**Simplicity:** Direct cutover conversion is a relatively simple conversion method since the old system is turned off, and the new system is turned on.

**Quick implementation:** Direct cutover conversion can be implemented quickly since there is no gradual phasing in of the new system.

**Cost-effective:** Direct cutover conversion is often less expensive than other conversion methods since it requires less time to implement.





4. (a) (i) 58 1
- (ii)  $p = \underline{1}$ ,  $q = \underline{2}$  1
- (b) (i)  $r = \underline{3}$  1
- (ii)  $s = \underline{4}$  1
- (iii)  $(i-1) * K + 1$  1  
 $(j-1) * K + 1$  1
- (c) (i) 15 1
- (ii) 41 1
- (iii) Find the maximum value in MAP. (largest number of restaurants in a cell) 1
- (iv) More unnecessary program statements are executed (slow). 1
- (d) Efficiency: The execution time is shorter as there is no need to translate every time. 1  
Translation is not needed during execution.  
Machine code is saved to an object file for multiple executions.
- Security: It is more difficult to reverse engineer or tamper with than interpreted code.  
No source code is needed during execution.
- Optimisation: Optimisation can be done during the compilation stage.
- Error checking: Errors in code can be caught during the compilation, before the program is executed.  
The error checking is comprehensive.
- (e) Time saving (Shorter development time) 1 × 2  
Reusability (Less redundant code)  
Functionality (Ready to use, no need for development)  
Reliability (Fewer bugs)  
Community support (Keeping up-to-date)
- (f) Higher code reusability (Inheritance/class) 1 × 2  
Allow information hiding (Encapsulation/abstraction)  
Higher flexibility in methods (Polymorphism)