Question	Answer	Marks
1(a)	**1 mark** for each correct definition <table><tr><td>**Term**</td><td>**Definition**</td></tr><tr><td>Drawing list</td><td>All the drawing objects in an image // a list that stores the commands required to draw each object</td></tr><tr><td>Pixel</td><td>The smallest part of the image // one square / dot of one colour</td></tr><tr><td>Colour depth</td><td>The number of bits per pixel // determines the number of colours that can be represented in the image</td></tr></table>	3
1(b)(i)	**1 mark** each Examples: • Confirmation that it is a bitmap // file type • Compression type • Location/offset of data within the file • Dimensions e.g.100 × 100 pixels	2
1(b)(ii)	**1 mark** for working; **1 mark** for answer • Working: (1500 * 3000 * 8) / 1000 / 1000 • Answer: 36 MB	2
1(c)(i)	**1 mark** each Examples: • The customers will be able to download the photographs in less time • …and they will take less of the customer's bandwidth • The photographs will take up less space on the customer's storage medium • …therefore the customers can store more images • …and will have more space for other files	3
1(c)(ii)	**1 mark** each to **max 2** for explanation; **1 mark** for an image related example • RLE stores a colour and the number of times it occurs consecutively • An image may not have many sequences of the same colour • It would need to store each colour and then the count/number 1 which adds data Example: • Red-Green-Blue would become Red 1 Green 1 Blue 1	3

Question	Answer	Marks
2(a)(i)	**1 mark** for definition: • Data about the data in the database // data about the structure of the database // metadata for a database **1 mark** for a suitable example Examples: • table names • data types • field names	2
2(a)(ii)	**1 mark** for definition • Methods of making sure the data is consistent **1 mark** for example Examples: • Enforcing referential integrity • If data in one table is deleted/edited all tables are updated // cascading update/delete • Validation/verification rules	2
2(b)(i)	**1 mark** for each field name and table <table><tr><th>Foreign key</th><th>Database table</th></tr><tr><td>BirdID</td><td>BIRD_SEEN</td></tr><tr><td>PersonID</td><td>BIRD_SEEN</td></tr></table>	2
2(b)(ii)	**1 mark** for all 3 correct lines 	1

2(b)(ii) diagram:

Normal Form
- First Normal Form (1NF)
- Second Normal Form (2NF)
- Third Normal Form (3NF)

Definition
- All fields are fully dependent on the primary key.
- There are no repeating groups of attributes.
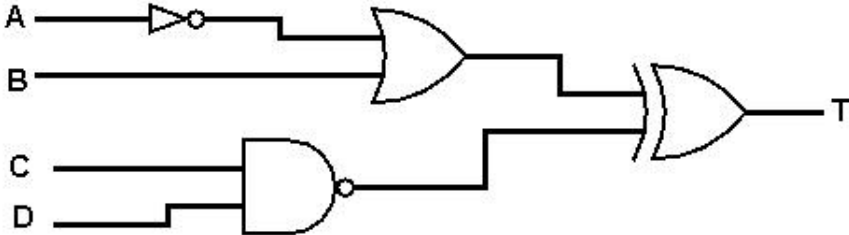- There are no partial dependencies.

Lines: First Normal Form (1NF) → There are no repeating groups of attributes; Second Normal Form (2NF) → There are no partial dependencies; Third Normal Form (3NF) → All fields are fully dependent on the primary key.

Question	Answer	Marks

2(b)(iii)	**1 mark** each
	
	• CREATE TABLE start and end bracket
	• Bird ID as CHAR/VARCHAR
	• Name **and** size as VARCHAR/CHAR
	• Bird ID as primary key
	
	Example answer:
	`CREATE TABLE BIRD_TYPE(`
	`  BirdID CHAR(4) NOT NULL,`
	`  Name VARCHAR(9),`
	`  Size VARCHAR(6),`
	`  PRIMARY KEY (BirdID)`
	`);`
		4

2(b)(iv)	**1 mark** for each correctly completed space
	
	`SELECT BIRD_TYPE.Size,` **`COUNT`**`(BIRD_TYPE.BirdID) AS NumberOfBirds`
	
	`FROM BIRD_TYPE,` **`BIRD_SEEN`**
	
	`WHERE` **`BIRD_SEEN.PersonID`** `= "J_123"`
	
	`AND BIRD_TYPE.BirdID =` **`BIRD_SEEN.BirdID`**
	
	`GROUP BY` `BIRD_TYPE.Size;`
		5

Question	Answer	Marks
3(a)	**1 mark** each to **max 4** Examples: • **Installs** device drivers • … to allow communication between peripherals and computer • Sends data and receives data to and from peripherals • … such as to an output device and from an input device/by example • Handles buffers for transfer of data • … to ensure smooth transfer between devices that transmit and receive at different speeds • Manages interrupts / signals from the device	**4**
3(b)	**1 mark** each to **max 2** • Memory management • File management • Security management • Process management • Error checking and recovery	**2**

Question	Answer	Marks
3(c)	**1 mark** each to **max 3** • Rearranges blocks of individual files (on the HDD) so they are contiguous // moves the free space together • Accessing each file is faster • …because there is no need to search for the next fragment / block of the file • …so less head movement is needed	**3**
3(d)(i)	**1 mark** from • Kibibyte is 1024 bytes and kilobyte is 1000 bytes • Kibibyte is binary prefix and kilobyte is denary prefix	**1**
3(d)(ii)	1001 0110 0100	**1**
3(d)(iii)	F2	**1**
3(d)(iv)	Smallest: 10000000 Largest: 01111111	**2**
3(d)(v)	**1 mark** for working **1 mark** for answer 1 0 1 1 0 0 0 0 + 0 0 0 1 1 0 1 1 1 1 0 0 1 0 1 1 1 1	**2**
3(d)(vi)	00011001	**1**

Question	Answer	Marks
4(a)(i)	**1 mark** each to **max 2** • Stores the bootstrap program // start-up instructions **for the central computer** // BIOS • Stores the start-up instructions for the CCTV system/cameras // firmware for CCTV • Stores the kernel of the Operating System // stores parts of the Operating System	2
4(a)(ii)	**1 mark** each to **max 2** • Costs less per unit • Higher storage density • Simple design – uses fewer transistors	2
4(b)	**1 mark** for reason, **1mark** for application/justification • The computer will have a large number of read/write operations because it is working all the time • .. magnetic storage has more longevity • Magnetic storage costs less per **storage unit** • … videos are large files and therefore very large storage capacity is required	4
4(c)	**1 mark** each to **max 3** Examples: • Uses image recognition • Monitors every image taken to identify matching images/shapes/features to a 'person' … • … starts recording to secondary storage/permanently when a person is identified • System identifies direction of movement of person and uses this to decide where/how to move the camera/record • System identifies other cameras to start recording based on direction of movement	3
4(d)(i)	**1 mark** for each term An IPv4 address contains **4** groups of digits. Each group is represented in **8** bits and the groups are separated by full stops. An IPv6 address contains **8** groups of digits. Each group is represented in **16** bits. Multiple groups that only contain zeros can be replaced with a **:: //** **double colon**.	5

Question	Answer	Marks
4(d)(ii)	**1 mark** for identification, **1mark** for expansion e.g. • Reduce amount of traffic in a network // improve network speed • Data stays in its subnet so it does not travel as far • Improves network security • .. so that not all devices can access all areas of the network • Allows for easier maintenance • … because only one subnetwork may need taking down/changing while the rest of the network can continue	4

Question	Answer	Marks
5(a)	**1 mark** for 2 gates **2 marks** for all 4 gates 	2
5(b)	**1 mark** each NAND 0 is **only** output when both inputs are 1 // 1 is **only** output when none, or (either) one of the inputs is 1 NOR 1 is **only** output when both inputs are 0 // 0 is **only** output when (either) one or both inputs are 1	2

Question	Answer	Marks
6	**1 mark** each to **max 5** • An interrupt flag is raised in the (interrupt) register • At the end of the current FE cycle // at the start of the next FE cycle • The system checks the interrupt register for higher priority interrupts than current process • If true, it stores the current contents of the registers on the stack • The appropriate interrupt service routine (ISR) for the key press is called • The input data from the keyboard is processed • The contents of the registers are restored from the stack • ... and control is passed back to previous process	5