These marking guidelines consist of 16 pages.
SECTION A: SHORT QUESTIONS

QUESTION 1

1.1 1.1.1 A ✓ (1)
1.1.2 D ✓ (1)
1.1.3 A ✓ (1)
1.1.4 C ✓ (1)
1.1.5 B ✓ (1)

1.2 1.2.1 Hotspot ✓ (1)
1.2.2 Hot swappable/pluggable ✓ (1)
1.2.3 Computer worm ✓ (1)
1.2.4 Botnet/Bots/Zombie PC's ✓ (1)
1.2.5 Wiki ✓ (1)
1.2.6 Firewall ✓ (1)
1.2.7 (Update/delete) anomaly ✓ or redundancy (1)
1.2.8 Push ✓ technology/notification (1)
1.2.9 Rootkit ✓ (1)
1.2.10 Overflow ✓ (1)

TOTAL SECTION A: 15
SECTION B: SYSTEMS TECHNOLOGIES

QUESTION 2

2.1 2.1.1 Windows ✓

2.1.2 Any THREE functions of an operating system: ✓ ✓ ✓
- Supply an interface/GUI/UI
- Manage all the processes and tasks/apps/software
- Manage the computer memory/RAM
- Manage the input and output to and from the computer system
- Manage all disk drives/hardware

2.1.3(a) Multitask processing:
The computer appears to run multiple programs ✓ simultaneously by sharing processing time of the CPU ✓ between processes/tasks

Concepts:
- Any indication of multiple programs/applications
- Sharing of CPU time between programs

2.1.3(b) Multithreading:
When a single program is broken up into independent parts/threads ✓ that run at the same time ✓.

Concepts:
- Program/application is split into parts/threads
- Independent processing

2.2 4/multiple processor cores ✓ on one CPU chip

2.3 Any TWO ✓ ✓
- The amount of RAM that can be addressed by the operating system (32 bit and 64 bit operating system) is limited
- The number of RAM slots on the motherboard is limited
- The cost of RAM – expensive
- RAM stores current instructions being processed
- The hard drive is storage of all data/software

2.4 2.4.1 Any ONE ✓
- Allows connection/access to the Internet/different networks
- Explanation of routing

2.4.2 LTE/Wi-Fi ✓
2.5 A graphics card generates images ✔ faster using the GPU (graphics processor unit).
The use of a separate video card will allow the CPU to focus on carrying out program instructions ✔ thus reducing the load on the CPU.

Concepts:
• Generation of images/graphics card has own processor
• Taking load away from CPU/GPU is faster at generating images

2.6 Cache memory is high speed memory that stores data and instructions ✔ most likely to be needed next by the CPU, preventing the CPU from having to load it from the slower RAM ✔

Concepts: Any TWO
• Cache is high speed memory
• CPU does not have to fetch data and instructions from slower RAM
• Stores data and instructions most likely to be needed next by the CPU

1 mark only: Caching is preventing a slow process from slowing down a faster process

2.7 2.7.1 The operating system detects the new device ✔ and installs the drivers automatically ✔

OR

The flash drive makes itself known to the operating system and then the operating system configures the drivers for use

Concepts:
• Operating system detects new device
• Installation of device drivers/automated configuration

2.7.2 By sending a hardware interrupt signal (IRQ) ✔

2.8 Allows the user to access the latest version of the files ✔ on different devices. ✔

OR

Changes in files are automatically updated between devices

NOTE:
Do not accept: add or access from anywhere/online/backup
2.9 Indexing the files means that the operating system has an index that includes the text inside the files as well as the file names. It allows you to search for words or phrases that you can remember that might be inside the document instead of just for a file name.

Concepts:
- Storing additional information about the files/content of files
- Faster/easier location of files

2.10 2.10.1 Any ONE ✓
- SSD
- ROM
- EEPROM
- Hard drive (HDD)

2.10.2 Any TWO ✓✓
- Smaller display areas
- Input constraints/limited number of input devices
- Limitation in hardware/processing capabilities
- Limited memory
- Limited storage space on mobile devices
- Extending battery life/limiting power usage
- Availability of facilities such as GPS/Accelerometer, etc.
- Compatibility between devices
- The amount of data that the application will use

TOTAL SECTION B: 27
SECTION C: COMMUNICATION AND NETWORK TECHNOLOGIES

QUESTION 3

3.1  3.1.1 Any ONE ✓
• UTP/STP (CAT 5/CAT 6)
• fibre optic cables

Also accept: co-axial cables  (1)

3.1.2 Star ✓  (1)

3.1.3 (a) TCP/IP (IPv4/IPv6) /Internet protocol ✓  (1)

3.1.3 (b) http/https ✓  (1)

3.2 The user can log on over a public network ✓ like the Internet with the same, if not better, benefits of privacy and security ✓ of a LAN.

Concepts:
• Secure log on/secure connection
• From remote location/over Internet/public network  (2)

3.3  3.3.1 Invisible ✓ data capturing  (1)

3.3.2 Any ONE real life example of data capturing ✓ and explanation ✓

• Buying with credit card or using a loyalty card – type of products you buy/information on your lifestyle
• Completing forms – extra information that is not always relevant to form/form does not only go to intended recipient
• Via the Net – sites you visit or bookmark/comments on social networks/content of e-mails
• Using e-tags – travel habits/locations visited
• Telecommunication system – who you call/where you are – predict lifestyle etc.

Or any other valid example that leaves an electronic trail

NOTE:
Do not accept any indication of theft of personal information  (2)

3.3.3 Purpose of targeted marketing/supplied information. ✓  (1)
3.4 Any THREE: ✓✓✓

- JavaScript/Browser side scripting
- Server side instructions/scripting/code
- SQL stored procedures
- AJAX
- Applescript
- HTML4/HTML5
- PHP
- jQuery
- Python
- Ruby

Or any acceptable verifiable scripting language (3)

3.5 3.5.1 Cookie: ✓ stored on your local computer that is used to save user settings/preferences ✓ for a website. (2)

3.5.2 Any ONE effect of deleting a cookie: ✓

- Loss of interactivity
- The next time you open that webpage only default settings are available
- Website/page loads more slowly (1)

3.6 Any TWO disadvantages of using VolP: ✓✓

- Need an Internet connection
- Both users need the same software
- Need to purchase credits to call phones not on the Internet
- Poor call quality (when using a slow connection)
- Data cap can be reached quickly/uses data (2)

3.7 Any ONE ✓

- Allows one to locate the position of devices/people
- Navigation capabilities
- Global position system
- Geotagging

Or any other acceptable positioning example (1)
3.8  3.8.1 DRM (*Digital Rights Management*) refers to any software which uses some form of encryption ✓ and manages access ✓ to the content of electronic media.

**Concepts:**
- Software using encryption/prevents copying
- Manages access/rights to electronic content/media

3.8.2 Any ONE area of application of DRM software ✓

- Digital books
- Movies/music
- Computer games/software/apps

**TOTAL SECTION C:** 22
SECTION D: DATA AND INFORMATION MANAGEMENT

QUESTION 4

4.1 4.1.1 Any ONE reason why ID field may not be integer data type: ✓
• Leading 0's will not be saved
• Size of ID numbers will exceed integer capacity/storage size of an integer/number of bytes (1)

4.1.2 Any ONE reason why no other field can be the primary key: ✓
• All the other fields can contain duplicate values
• Only JobCardNumber will contain unique values (1)

4.1.3 Since the DateStarted and DateCompleted fields are available ✓, the NumDaysTaken field can be calculated (1)

4.1.4(a) ID ✓ (1)
4.1.4(b) tblJobCards ✓ (1)

4.2 Any ONE explanation of verifying information: ✓
• Ensuring that information corresponds to original information at the source
• Ensuring that one can prove that data is correct/confirming correctness (1)

4.3 • Extract only the first character of the gender entered ✓
• Change the character to uppercase ✓

Also accept: code/algorithim. (2)

4.4 4.4.1 SELECT OrderNum, Description, OrderDate ✓ FROM tblEquipment ✓
WHERE Delivered = false ✓
AND year(OrderDate) = 2016 ✓

Alternative statements:
• AND OrderDate like "2016%"
• AND Year(OrderDate) like "2016%"
• AND OrderDate between #2016/01/01# and #2016/12/31#
• AND MID(Str(OrderDate),1,4) = "2016"
• AND OrderDate >= #2016/01/01# AND OrderDate = < #2016/12/31#
• AND OrderDate > #2016/01/01# AND OrderDate < #2016/12/31#

NOTE:
AND should be marked with the second condition (4)
4.4.2  UPDATE tblEquipment ✓
SET Delivered = true ✓
WHERE Description = "Broom" ✓

Alternative:
WHERE Description like "Broom%"

4.4.3  SELECT Teacher, ✓
count(*) as numOrders ✓
FROM tblClassroom, tblEquipment ✓
WHERE
tblClassroom.RoomNumber = tblEquipment.RoomNumber ✓
GROUP BY Teacher ✓

OR

SELECT Teacher, count(*) as numOrders FROM tblClassroom
INNER JOIN tblEquipment ON tblClassroom.RoomNumber =
tblEquipment.RoomNumber GROUP BY Teacher

NOTE:
• Can use LEFT JOIN or INNER JOIN
• Make use of aliases
• Count any field

TOTAL SECTION D: 20
SECTION E: SOLUTION DEVELOPMENT

QUESTION 5

5.1  5.1.1 Any TWO advantages of modular programming: ✓✓
- Easier to debug/fewer bugs
- Reuse of code/Avoids duplication of code
- Can be used by other classes/units/programs
- Allows library programs to be inserted thereby saving time.
- Different programmers can work on specific modules based on their expertise
- Collaboration/many programmers can work on same program
- Shorter algorithms makes the module easier to trace and understand

5.1.2 A private function is only accessible from within ✓ the class / unit
A public function is accessible from outside ✓ the class/project

5.2  5.2.1 True ✓

5.2.2 False ✓✓

5.3 Loop from 1 to length of word ✓
reverseWord (✓ addition) ← word[loop] ✓+ reverseWord; (✓ order)
OR
Loop from length of word down to 1
reverseWord ← reverseWord + word[loop]

Concepts:
- Loop through word
- Extract character (logic of code must be correct)
- Add onto new word
- Order of addition

5.4  5.4.1 iSum := iSum ✓+ arrLightBulbs ✓ [loop ✓, loop ✓];

Also accept:
4 marks - iSum := iSum + arrLightBulbs[r, r];
3 marks – if any other letter is use for both index values
e.g. iSum := iSum + arrLightBulbs[x,x]

If hard coded – max 2 marks

5.4.2(a) Syntax ✓

5.4.2(b) Logical ✓

5.4.2(c) Syntax ✓
5.4.3  Reset: (any ONE) ✓
• Opens an existing text file for reading
• Moves the file pointer to the first record

Rewrite: (any ONE) ✓
• Creates a new text file
• It clears the content of the existing file
Do not accept: Writing to file

5.5  5.5.1(a)  Any ONE: ✓
• Object cannot create/instantiate itself
• Object does not exist
• Need to use class name with create

Do not accept:
• Not allocated to a variable
• Rewriting of code

5.5.1(b)  Incorrect order of arguments/parameters ✓

5.5.1(c)  Any ONE ✓
• Incorrect data type/type mismatch – string and integer
• There should not be inverted commas around the number

5.5.2(a)  Mutator ✓
Also accept: Auxiliary

5.5.2(b)  Auxiliary ✓

TOTAL SECTION E:  25
SECTION F: INTEGRATED SCENARIO

QUESTION 6

6.1 Any TWO ✓✓
- IT technician
- Network engineer
- Network architect
- Network administrator
- Network analyst

Do not accept:
- Programmer
- Any job related to database/database administrator

6.2 6.2.1(a) Biometrics:
The use of personal characteristics ✓ to authenticate the identity of a person

Also accept: Use parts of the body for access control

6.2.1(b) Any ONE suitable example of biometrics in this scenario: ✓
- Retina/eye
- Fingerprint
- Voice recognition
- Facial recognition
- Palm readers

6.2.2 Any TWO ✓✓
- RFID cards can be read from a distance that can trigger the unlocking of the room even when not required
- Cards do not validate the identity of the user
- Cards can be stolen/lost
- Cards can be cloned
- Inconvenience of carrying cards around
- Cost of manufacturing cards

6.3 6.3.1 Virtual memory:
Hard drive space/storage ✓ reserved by the operating system to be used as RAM/memory ✓

Also accept for 2 marks: Hard drive space to be used when the RAM is full

6.3.2 Operating system ✓

6.3.3 Any ONE way to limit the use of virtual memory: ✓
- Add more RAM
- Do not open too many applications/Close applications not in use
6.4  Lossless – no data is lost ✓
     Lossy – some insignificant data is lost ✓

6.5  6.5.1  Protocol:
     A set of rules ✓ for transmission of data across a network/encoding
     and decoding data for transmission. ✓

6.5.2  (Sending) e-mail ✓

6.6  6.6.1  Distributed database:
     Parts of a database ✓ are spread over multiple servers in different
     locations ✓

     Concepts:
     • Splitting database
     • Multiple locations

6.6.2  Any TWO advantages of distributed database: ✓ ✓
     • Eliminate congestion on a single server
     • Can handle a large number of simultaneous users
     • The branches of a company can be spread over a large
       geographical area
     • If one server is down, other databases can still be used
     • Lower cost of communication as less data is being
       communicated

6.7  6.7.1  Any ONE: Web 1.0: ✓ ✓
     • Mainly static web pages
     • Each user sees the same content every time/no interactivity.

     Also accept for 1 mark: Few content creators, many users

6.7.2(a) The Semantic Web:
     Has the ability to interpret information ✓ like humans and provide
     useful content tailored to user needs/personalization. ✓

6.7.2(b) The Internet of Things ✓

6.8  6.8.1  Online seminar ✓

6.8.2  Any ONE ✓
     • Comfort of own office/home
     • Saving on travel costs/time
     • Expand knowledge base

     OR any other acceptable answer
6.9  6.9.1  **SaaS:** Software as a Service ✓

6.9.2  **Any ONE - Cloud applications:** ✓ ✓

- Software where most of the processing is done in the cloud/the processing is done by servers which are accessible via the Internet
- The interface is created on the web servers/on local computers using apps or interface is accessed through a web browser

**Concepts: Any TWO**

- Local user interface
- Software/applications run on servers on the web
- Servers/service are accessible via Internet

6.9.3  **Any TWO disadvantages associated with using online services:** ✓ ✓

- Software is not owned and a regular fee needs to be paid.
- Cost of data used when everything is transferred from the cloud can be high.
- When Internet is down, software cannot be accessed.
- When the service is down, software cannot be accessed.
- Exposure to security issues when documents are stored in cloud.
- Too many users can slow down the service.

6.10  RSS is a web or news feed/automatic ✓ provision to users of updated content ✓ and/or notifications of new content from websites

6.11  6.11.1  **Any TWO responsible uses of social networking sites** ✓ ✓

- Limit time on web/Turn off notifications when doing important work/Switch off mobile device at specific times
- Try to remove yourself from FOMO
- Refrain from insulting other people/Bullying
- Be aware that all posts are public
- Be aware that the Internet never forgets information/cannot delete information from the Internet
- Do not share personal information e.g. ID number or bank account numbers
- Do not befriend strangers

OR any suitable answer
6.11.2 Any TWO reasons why cybercrime is prevalent: ✓✓

- Low risk of physical danger to criminal/not physically present when crime is committed
- Difficult to detect a crime
- Difficult to trace who committed the crime
- Increase use of Internet
- Increased number of online financial transactions
- People's general ignorance and carelessness

6.11.3 Piggybacking ✓

6.12 6.12.1 A machine that have a certain amount of autonomous flight capabilities, while still being controlled by a human. ✓

OR any similar explanation
Accept: control of flying object

6.12.2 Any TWO benefits of 3D printing ✓✓

- No other complicated machinery needed for manufacturing
- Parts can be computer designed and directly printed
- Easy to change design and print again
- Parts that fail can easily be printed again
- No waiting period for ordered parts
- More cost effective for small numbers

OR any other acceptable answers

TOTAL SECTION E: 41
GRAND TOTAL: 150