10(a)

One mark for both declarations correct

```
DECLARE Seconds : INTEGER
DECLARE Minutes : INTEGER
```

10(b)

One mark per bullet point

- `PROCEDURE` and `ENDPROCEDURE` naming the procedure `Time` with parameter
- correctly calculating minutes
- correctly calculating seconds
- output the minutes and seconds

Example

```
PROCEDURE Time(TotalSeconds : INTEGER)
    Minutes ← DIV(TotalSeconds, 60)
    Seconds ← MOD(TotalSeconds, 60)
    OUTPUT "The number of minutes is ", Minutes
    OUTPUT "The number of seconds is ", Seconds
ENDPROCEDURE
```


5(a)

Term	Definition
current instruction register (CIR)	**stores the instruction that is being decoded/executed**
core	This is a processing unit within the CPU that can fetch, decode and execute instructions.
instruction set	This is a list of all the commands that can be processed by the CPU.
cache	**stores frequently used data/instructions**
accumulator	**stores the result of interim calculations**

5(b)

Control unit // CU

5(c)

Three from:

- On each clock pulse, an FDE cycle is performed.
- The clock speed is the number of FDE cycle performed in a second // The clock speed is the number of times the clock pulses per second/per unit of time.
- If clock speed is increased more FDE cycles can be performed in a second // If clock speed is decreased fewer FDE cycles can be performed in a second.
- If clock speed is increased, it can improve the performance of the CPU // If clock speed is decreases it decreases the performance of the CPU.

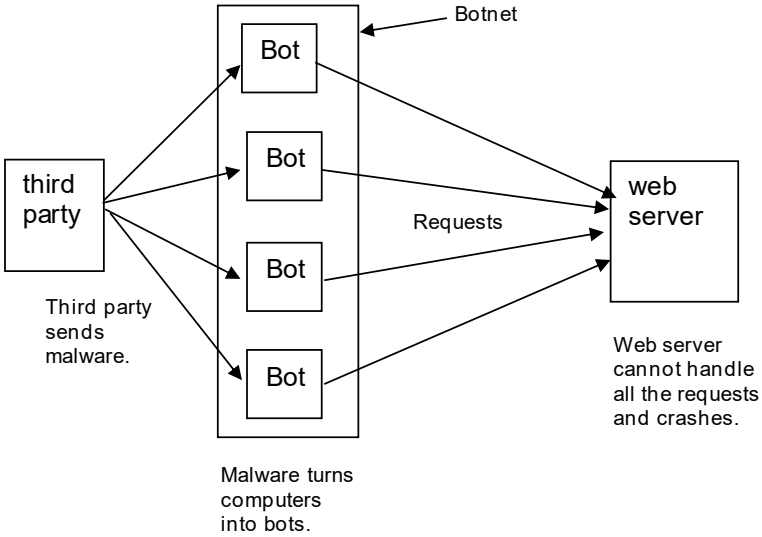
5(a)

Any **two** from:

- **storing** a database of URLs and matching IP addresses
- **search** its database for the matching IP address.
- send the URL to another DNS **if URL cannot be found.**
- return the IP address to the web browser

5(b)

D

5(c)(i)	**One** mark for each part of the diagram that shows: • A perpetrator/third party sending malware // user downloads/installs malware • Each computer is turned into a bot … • … to create a botnet. • Third party initiates the attack. • **All** the bots send a request at once to the web server. • … crashing the web server. Example: 
5(c)(ii)	• Hide a public IP address • Caching
5(d)(i)	B
5(d)(ii)	Any **three** from: Examples: • Store user's login details. • Store user's payment details. • Store user's preferences. • Use for targeted advertising.
5(d)(iii)	Any **two** from: Examples: • Storing bookmarks/favourites • Recording user history • Allowing use of multiple tabs • Providing navigation tools • Providing an address bar

4(a)	Any **four** from: • The data packet has three sections • It has a packet header … • … that contains data such as the destination address • It has a payload … • … that contains the main data for the email • It has a trailer … • … that contains data such as the error detection system used
4(b)(i)	Any **four** from: • It sends the data multiple bits at the same time // It uses multiple wires • … so the transmission speed of the data will be fast • Data may not need to travel a long distance • … as the devices are all within a single room • It sends data in both directions at the **same time** • … so users on the network can send data to each other with **no delay**
4(b)(ii)	Any **two** from: • More interference/crosstalk (due to multiple wires) • **Data** may be skewed (due to multiple bits at a time) // bits may arrive out of order • More chance of data collisions (as data sent in both directions at the same time) • More chance of error in the data
4(b)(iii)	Any **one** from: • Serial simplex • Serial half-duplex • Serial full-duplex • Parallel simplex • Parallel half-duplex

1(a)	(1) byte
1(b)	8192
1(c)	(1) Tebibyte // TiB
1(d)	**One** mark for each correct stage of working (**max** 2): • 512 × 512 • 262 144 * 2 // multiplied by 16 and divided by 8 • 524 288/1024 **One** mark for the correct answer: 512 (KiB)

3(a)(i)	**One** mark for each correct nibble, in the correct order. 1010 0010 1111
3(a)(ii)	2607
3(b)(i)	**One** mark for each correct character, in the correct order. 1 9 B
3(b)(ii)	411
3(c)	Any **one** from: • It is easier/quicker to read/understand/debug • It is a shorter representation of binary // It takes up less **screen** space
3(d)	Any **two** from: Example: • **HTML** colour codes • URL • Memory dump • IP address • MAC address • Assembly language • Error codes/messages • ASCII/Unicode
3(e)	**One** mark for correct working: Example: flip and add **One** mark for correct answer. 11100111

<table>
<tr><td>5(a)(i)</td><td>Any two from:
e.g.
• Destination IP/address
• Packet number
• Originators IP/address
• Error detection method</td></tr>
<tr><td>5(a)(ii)</td><td>One mark each:
• Payload
• Trailer</td></tr>
<tr><td>5(b)(i)</td><td>No mark for choice.
Three from for justification that matches choice.

Serial
• Data arrives in order sent // does not need reordering
• Less likely to experience interference
• … less likely to have errors
• Can transmit over a longer distance (i.e. another room)
• Still fast transmission…
• …sufficient for this purpose

Parallel
• Faster transmission speed than serial
• … faster response to requests
• Very long connection not needed
• …next room is (likely) within distance for parallel
• … unlikely to error/arrive out of sequence/skew</td></tr>
<tr><td>5(b)(ii)</td><td>One mark each:
• Data goes in both directions…
• …at the same time</td></tr>
<tr><td>5(c)(i)</td><td>One mark each:
<table><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table></td></tr>
<tr><td>5(c)(ii)</td><td>One mark each:
• In parity check, interchange of bits will not be detected // Parity check cannot detect even number of changes // Parity check cannot detect error if parity stays correct …
• …the (possible) position of all changes will be highlighted // will identify the horizontal and vertical position of all differences/changes</td></tr>
<tr><td>5(c)(iii)</td><td>One mark each:
• Bit 6
• Byte 4</td></tr>
</table>

5(d)(i)	Any **two** from: e.g. • Storing bookmarks/favourites • Storing history • Allow multiple tabs/web pages to be open • Allow movement back and forth between web pages // provides navigation tools • Allows the user to enter a URL/IP into the address bar • **Manages** HTTP/HTTPS protocol • Search cache for IP // Request IP from DNS // Send URL to DNS • Sends a request to the **IP address/web server** (to obtain the contents of a web page) • Runs active script/JavaScript/client-side script • Allows **files** to be downloaded from **website/internet**
5(d)(ii)	Any **two** from: e.g. • Storing preferences // so the user does not have to select their preferences each time they visit the site • Storing account details // so the user does not have to remember/enter their username and password each time they visit the site • Storing recent purchases // to allow the user to quickly re-order more items • Storing the pages visited/items selected // to display relevant adverts • Storing shopping basket // so when the user leaves the site the items are still in their basket