COMPONENTS OF COMPUTER AND THEIR USES

TOTAL MARKS:21

QUESTION 1:

2 (a) The Fetch-Execute (F-E) cycle is represented in register transfer notation.

Describe each of the given steps.

Step	Description
PC ← [PC] + 1	....
MDR ← [[MAR]]	....
MAR ← [PC]	....

[3]

(b) Explain how interrupts are handled during the F-E cycle.

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ANSWER:

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>1 mark for each correct description
<table><tr><th>Step</th><th>Description</th></tr><tr><td>PC ← [PC] + 1</td><td>Address in PC is incremented</td></tr><tr><td>MDR ← [[MAR]]</td><td>The data in the address held in the MAR is copied to the MDR</td></tr><tr><td>MAR ← [PC]</td><td>The contents of the PC are copied to the MAR</td></tr></table></td><td>3</td></tr>
</table>

2(b)	**1 mark** per point to **max 5** • Check for interrupt at start/end of an F-E cycle • Priority is checked • If lower priority than current process continue with F-E cycle • If higher priority than current process … • … state of current process is / registers are stored on stack • Location/type of interrupt identified • Appropriate ISR is called to handle the interrupt • When ISR finished, check for further interrupts (of higher priority) / return to step 1 • Otherwise load data from stack and continue with next F-E cycle (of process)	**5**

QUESTION 2:

2 A computer has hardware and software.

(a) The hardware includes different types of memory.

(i) Complete the description of computer memory.

Random Access Memory (RAM) and Read Only Memory (ROM) are both examples of

..... memory.

One item that is stored in RAM is ..... .

One item that is stored in ROM is ..... .

RAM can be either Static RAM (SRAM) or Dynamic RAM (DRAM).

SRAM uses transistors arranged as ..... .

DRAM uses transistors and ..... .

[5]

(ii) Explain the difference between Programmable ROM (PROM), Erasable Programmable ROM (EPROM) and Electrically Erasable Programmable ROM (EEPROM).

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..... [3]

(b) A magnetic hard disk is used to store data on the computer.

Describe the principal operations of a magnetic hard disk.

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ANSWER:

Question	Answer	Marks
2(a)(i)	**1 mark** for each correct term. Random Access Memory (RAM) and Read Only Memory (ROM) are both examples of **primary** memory. One item that is stored in RAM is **currently running software/data/part of OS**. One item that is stored in ROM is **the start-up/boot-up instructions/BIOS**. RAM can be either Static RAM (SRAM) or Dynamic RAM (DRAM). SRAM uses transistors arranged as **flip-flops/latches.** DRAM uses transistors and **capacitors**.	**5**

2(a)(ii)	**1 mark** per bullet point to max 3 • PROM can be set once, EPROM and EEPROM can be overwritten multiple times. • EPROM needs to be removed from device EEPROM can be erased in situ. • EPROM and can be erased using UV light, EEPROM can be erased using voltage // is flash storage . • EPROM must be entirely erased before rewriting, EEPROM does not have to be entirely erased before rewriting.	**3**

Question	Answer	Marks
2(b)	**1 mark** per bullet point to **max 5** • The hard disk has (one or more) platter/plate/disk • Each surface of the platter/disk is (ferrous oxide which is) capable of being magnetised • The platters/disks are mounted on a (central) spindle • The entire mechanism is contained inside a sealed (aluminium) box. • The disks are rotated (at high-speed) • (Each surface of the disk) has a read/write head mounted on an arm (positioned just above the surface) • Electronic circuits control the movement of the arm (and hence the heads) • The surface of the platter/disk is divided into concentric tracks / circles • The surface of the platter/disk is divided into sectors • One track in one sector is the basic unit of storage called a block • The data is encoded as a magnetic pattern for each block • When writing to disk, a variation in the current in the head produces a variation in magnetic field on the disk • When reading from disk, a variation in magnetic field produces a variation in current through the head	**5**