education

Department:
Education
REPUBLIC OF SOUTH AFRICA

# NATIONAL SENIOR CERTIFICATE

## GRADE 12

**INFORMATION TECHNOLOGY P2 (Theory)**

**FREE STATE**

**COMMON PAPER JUNE 2009 : MEMORANDUM**

**MARKS: 180**

**TIME: 3 hours**

**MEMORANDUM**

**SECTION A**
**QUESTION 1**

| | | | |
|---|---|---|---|
| 1.1 | D | PCI Express | ✓ |
| 1.2 | B | ALU | ✓ |
| 1.3 | D | FPU | ✓ |
| 1.4 | C | Multiprocessing | ✓ |
| 1.5 | A | Fibre optic | ✓ |
| 1.6 | B | IrDA | ✓ |
| 1.7 | D | Unix | ✓ |
| 1.8 | C | data mining | ✓ |
| 1.9 | A | biometric devices | ✓ |
| 1.10 | A | Blog | ✓ |

**[10]**

**SECTION B**
**QUESTION 2**

2.1
2.1.1 *Mark 5 components and 5 functions (one mark each)* (10)

| | |
|---|---|
| Control unit ✓ | The control unit is in charge of the entire process (machine cycle). The control unit makes sure that data is fetched and sent away and that each instruction is loaded and executed. It manages all the other components in the CPU. ✓ |
| Arithmetic Logic Unit (ALU) ✓ | The ALU is responsible for making comparisons and for doing integer arithmetic. ✓ |
| Floating Point Unit (FPU) ✓ | The FPU does the same as the ALU except that it works with real numbers (i.e. numbers with decimals). ✓ |
| Registers ✓ | Registers are temporary storage areas within the CPU. All data must be loaded in a register before it gets processed. Some registers serve specific purposes, such as the Program Counter in the control unit which keeps track of which instruction the CPU is executing There are many registers in the CPU which are multi-purpose as well. ✓ |
| Cache ✓ | Cache memory is a special high-speed memory reserved for the temporary storage of the data or instructions likely to be needed next by the processor. ✓ |

2.1.2
- The instruction to be executed is **fetched** from memory to the CPU. ✓
- The control unit **decodes** the instruction. Each instruction usually has two parts to it, namely the opcode or the actual instruction for the CPU to follow and the address of the memory from which data must be fetched or stored to. During this step, the control unit breaks the whole instruction into its different parts. In other words, the opcode is separated from the address.
- If data is to be used in the operation, then it is **transferred** at this point. Data is usually moved into or out of the registers so that the ALU or FPU can do calculations or comparisons with it. ✓
- The instruction is **executed**.✓ (4)

2.1.3 IRQs (or interrupt requests) are the means by which hardware components request computing time from the CPU. ✓ (1)

2.1.4 Dual-core processors refer to having two physical CPUs together on one chip and quad-core processors have four physical CPUs together on one chip. ✓✓ (2)
2.2

2.2.1 (4)

- The computer is switched on. Instructions are transferred from the BIOS program (stored in the ROM) to the CPU✓
- The BIOS program gets the CPU to load configuration of hardware devices from CMOS memory. The POST (Power On System Test) is performed to check all devices are working properly. ✓
- The BIOS gets the CPU to load an operating system from the storage device specified in the system configuration (stored in the CMOS). ✓
- The operating system is loaded from secondary memory into RAM and takes over control of the computer. ✓

2.2.2 *Any five each* (5X2=10)

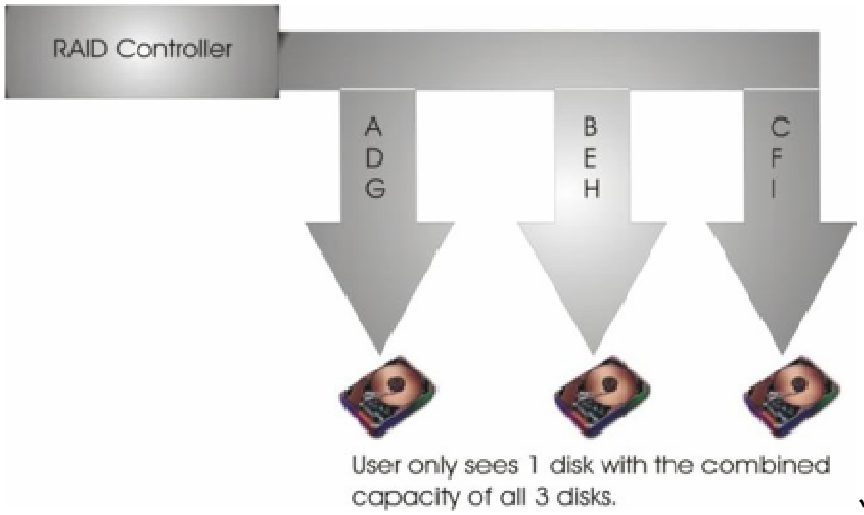
| **DRAM** ✓✓✓✓✓ | **SRAM** ✓✓✓✓✓ |
|---|---|
| Used for normal system memory and video memory. | Used for areas where speed is vital such as cache memory and in the memory in digital cameras and in cellphones etc. |
| Made up of capacitors. | Made up of transistors. |
| Needs to be refreshed constantly to retain it contents. | Does not need to be constantly updated to retain it contents. |
| Runs at the speed of motherboard (slower). | Runs at the speed of CPU (faster). |
| Much cheaper. | Much more expensive. |
| Found in larger quantities. | Used in small quantities due to the cost. |
| Can be purchased as a separate component and upgraded. | Fixed (unless you buy a new CPU). It is never purchased as a separate component. |

2.2.3 Moore's law predict that computing power would double every 18 months or so. ✓ (1)

2.3
- Redundant Array of Inexpensive Disks ✓ (14)

Level 0
- How it works
    - Striping ✓
        - Data is distributed across more than one disk creating a virtual disk. ✓

- What it is used for
    - Image editing, movie editing ✓
    - never for mission critical tasks because it has no fault tolerance ✓

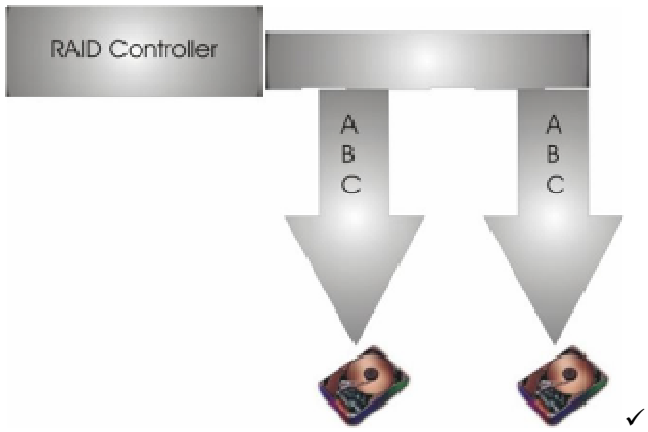


✓

Level 1

- How it works
  - Mirroring: the same data is written to a pair of disks✓

- What it is used for
  - Good for places where data availability is critical – accounting, payroll, financial ✓
  - High fault tolerance ✓

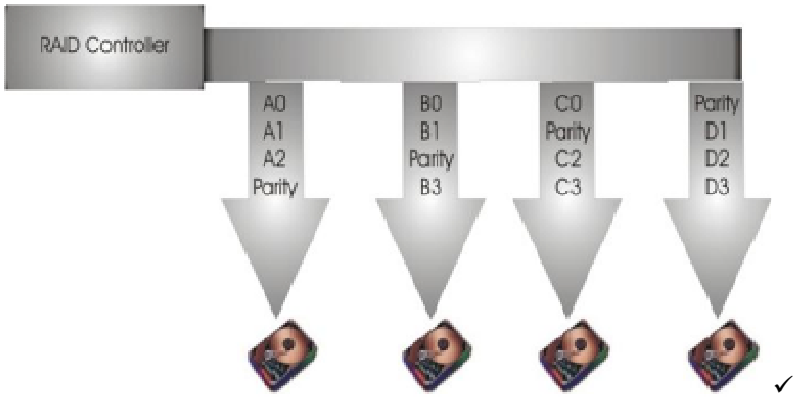


✓

- Level 5

- How it works
  - Striping with parity ✓

- What it is used for
  - Databases, database servers, file servers, web servers – versatile. ✓
  - Fault tolerance is medium – data can be recovered ✓



✓

2.4 Any FIVE: ✓✓✓✓✓ (5)

- Increasing the register size so that the computer can work with larger numbers and to be able to reference larger ranges of memory addresses directly.
- Clock multiplication so that the CPUs can work at an average of at least 10 x faster than the motherboard.
- Cache memory to reduce the time wasted by the CPU as it waits for data to come from RAM.
- New instruction set designs to perform operations faster.
- Pipelining where there are a couple of instructions in the pipeline, each in a different phase of completion at any given time.
- Superscalar architecture which simply means that there are two pipelines into the CPU.
- Hyperthreading where the operating system can be 'tricked' into seeing two CPUs when in fact only one is present.
- Multi-core technology where more than one processor is built onto the core.
- Reducing the size of the transistors on the CPU to make more 'powerful' components.

**[55]**

**SECTION C**
**QUESTION 3**

3.1
3.1.1 Any FOUR: ✓✓✓✓

- Sharing of hardware
- Sharing of data and software
- Centralisation of data
- Transfer of data
- Improved communication
- Entertainment (4)

3.1.2
3.1.2.1 Bus topology ✓
3.1.2.2 Ring topology ✓
3.1.2.3 Star topology ✓ (3)

3.1.3 Any FOUR:

- Portability and mobility ✓
- Cost savings ✓
- Flexibility ✓
- Planning ✓ (4)

3.2 Any connection (ISDN, ADSL, 3G, etc.) with sufficient reason. ✓✓ (2)

**QUESTION 4**

4.1 The digital divide is the gap between those who have regular access to technology and can use it to their benefit to enrich their lives and increase the productivity – and those who don't. ✓ (1)

4.2

- The Internet provides an opportunity to streamline and improve the government's services to the public. ✓
- Every government department in South Africa has a presence on the Web. It makes contacting them easier. ✓
- Instead of having to travel to a government department forms and publications can be downloaded from the Internet. ✓
- This includes e-forms and e-filing – with SARS for example. ✓ (4)

4.3 Any relevant example with sufficient reason. ✓✓ (2)

**[20]**

**SECTION D**

**QUESTION 5**

5.1
5.1.1 Date/Time (Short Date) ✓ (1)

5.1.2 The date of birth is included in the ID number. ✓ (1)

5.1.3 ID number – this field is unique for all the records. ✓ (2)

5.2 SQL Queries
5.2.1 SELECT * FROM tblRegistration ✓✓ (2)
5.2.2 SELECT [ID Number] FROM tblRegistration ✓✓✓ (3)
5.2.3 SELECT * FROM tblRegistration WHERE [Voting Station] = "Mangaung" ✓✓✓ (3)
5.2.4 SELECT * FROM tblRegistration WHERE [Voting Station] LIKE "Sa%" ✓✓✓✓ (4)
5.2.5 SELECT * FROM tblRegistration WHERE Province = "Free State" ✓✓✓ (3)
5.2.6 SELECT DISTINCT (Province) FROM tblRegistration ✓✓ (2)
5.2.7 SELECT [ID Number], [Date of Birth] FROM tblRegistration ORDER BY Surname ✓✓✓ (3)

5.3 FIVE:
- Increase accuracy of data ✓
- Eliminate redundancy (and save space) ✓
- Make maintenance easier and faster ✓
- Eliminate modification errors or anomalies ✓
- Faster and more accurate querying ✓ (5)

5.4 Normalisation refers to the process of following certain formal rules in dividing a database into two or more tables, assigning fields to every table and establishing the relationships between these tables. (1)

5.5
- Read values into an array. ✓
- Indicate how many elements need to be compared with each other. ✓
    - Set a Boolean value to indicate that no swapping has taken place. Assume the array has been sorted. ✓
    - Compare all consecutive elements that are not yet in their correct positions with each other. ✓
        - If the element in the current position is greater than the element in the next position. ✓
            - Swap the two elements. ✓
            - Set the Boolean value to indicate that swap has taken place. ✓
- Reduce the number of elements that must be compared with each other by one. ✓
- Repeat until array has been worked through without any swapping taking place. ✓ (9)

5.6 Inheritance means that a new class can be created by taking an existing class and allowing the new class to inherit all the features of the existing class. ✓ (1)

5.7 (10)

```
procedure TfrmValidID.btnCheckIDClick(Sender: TObject);
var
  sID : String;                                  ✓
  iLength, iMonth : Integer;                     ✓✓
begin
  sID := edtID.Text;                             ✓
  iLength := length(sID);                        ✓
  iMonth := StrToInt(copy(sID, 3, 2));           ✓
  if (iLength = 13) AND (iMonth <13) then        ✓✓
    lblOutput.Caption := 'ID valid'              ✓
  else
    lblOutput.Caption := 'ID not valid'          ✓
```

```
    end;
end.
```

**[50]**

**SECTION E**

**QUESTION 6**

6.1 Any 3 advantages and 3 disadvantages each (x2) (12)
*Peer-to-peer* ✓✓✓

| **Advantages** | **Disadvantages** |
|---|---|
| No server is necessary | All the computers have to be of a high standard with large disk capacity and powerful processors. |
| Software is cheaper as it is often built into many operating systems, for example Windows XP. | Can only be used with a small number of computers – 10 or less. |
| Can be installed by a person with reasonably low technical skills. | Can have a slow performance |
| Since there is no server, the machines can run as stand alones should a network fault occur. | Security is limited |
| Does not need a dedicated network administrator. | |
| | |

*Client/Server* ✓✓✓

| **Advantages** | **Disadvantages** |
|---|---|
| The rest of the computers in the network do not have to have a large disk capacity and can have a less powerful processor. | A server is required. |
| Faster performance. | A specialised network operating system such as Windows 2003 Server edition has to be installed on the server side. |
| Security is far more sophisticated | Has to be installed by a person with high technical skills such as a network engineer. |
| | Needs a dedicated network administrator. |
| | If the server crashes, or if there is a cable fault network dependant computers cannot be used |

6.2 Any two – for example: ✓✓ ✓✓
- Proxy servers: users connect to the internet via a proxy server so that security control can be implemented from a central point.
- E-mail servers: used to manage the e-mail needs of an organisation.
- Print servers: handle the printing in a large network (4)

6.3 (2)
6.3.1 Communication channel / cable ✓
6.3.2 Network card ✓

6.4
- Clients are computers (PCs or workstations) that use but do not provide network resources. They rely on servers for resources such as files and printing. ✓
- Servers are computers that only provide network resources. They are powerful computers with large hard drives and are never used as normal users' PCs. ✓ (2)

6.5
6.5.1 VoIP is a method that is use to transmit voice over a network in the same way in which data is transmitted. ✓ (1)

6.5.2 It allows the person to talk to anyone anywhere in the world (and still be able to send images, graphs and videos simultaneously) as long as that person is also connected to the Internet at the same time. It also allows you to speak to many people at the same time using conference call technology. ✓✓ (2)

6.5.3 Skype ✓ (1)

6.6 *Use own discretion / Example answer:*
- The successful candidate will have at least an A+ and N+ as well as the CCNP qualification. ✓
- The candidate will have experience in the setting up of networks and file servers. ✓
- He/she will be comfortable with setting up complicated security for the system and the management of such a network. ✓
- It will be the tasks of the successful candidate to make sure that backups are made regularly of all work and that network problems do not hamper the running of the school. ✓ (4)

6.7
- Used for long distance transmission ✓ (4)
- Across inhospitable terrain; also used to link separate buildings where physical cables would be a problem. ✓
- Expensive ✓
- Point-to-point, line of sight (i.e. the dishes must be able to 'see' each other.) ✓

6.8 *Any THREE each* (3x2=6)
ADSL ✓✓✓
- Permanent digital connection – fast, broadband
- A monthly cost to ISP
- A fixed cost paid for the rental of line
- Can make normal phone calls and be connected to the internet at the same time
- You pay for normal phone calls but not connection time to internet
- Capped bandwidth

DIGINET ✓✓✓
- Dedicated or leased line for business WANs
- Fixed permanent connection method
- Expensive
- More cost effective solutions now available

6.9 Communications protocol: (2)
- a standard that provides a set of rules and procedures✓
- used for determining how data is transferred between any two devices in a computer network✓

6.10 *Use own discretion:* (5)
6.10.1 Websites: publishing results using HTML✓
6.10.2 Wikis: adding results to relevant pages on Wikipedia and similar sites✓
6.10.3 Mailing lists: sending results to subscribed individuals✓
6.10.4 Blogs: distributing the results to relevant blogs✓
6.10.5 Podcasts: recording relevant video clips✓

**[45]**

**TOTAL: 180**