SENIOR CERTIFICATE EXAMINATION

COMPUTER STUDIES P2
HIGHER GRADE
2012
MEMORANDUM

MARKS: 200

This memorandum consists of 10 pages.
QUESTION 1: BOOLEAN ALGEBRA

1.1 1.1.1 \( F(p,q,t,w) = S(2,7,9,10,13,15) \)
\( \checkmark \checkmark \) all correct – 1 for each incorrect value (2)

1.1.2 \( \checkmark \checkmark \) for grouping
\( \checkmark \) for labels
\( F(p,q,t,w) = p' \ t' \ w \checkmark + w' \ q' \ t \checkmark + q \ w \ t \checkmark \) (6)

<table>
<thead>
<tr>
<th>pqwx</th>
<th>00</th>
<th>01</th>
<th>11</th>
<th>10</th>
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</table>

1.2 \( F(x,y,z) = z( x \ y + x' \ y + y') \)
\( = z( y \ (x + x') \checkmark + y') \)
\( = z( y \ .1 \checkmark + y') \)
\( = z \ (1) \)
\( = z \checkmark \) (4)

1.3 \( p'q' + p = q' + p \checkmark = (q \checkmark p') \checkmark \) (3)

1.4

\[ \text{Diagram} \]

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QUESTION 2: COMPUTER ARCHITECTURE

2.1 AMD ✓ (1)

2.2 1 processor ✓ with 2 cores on it ✓ (2)

2.3 2.3.1 serial ✓ (1)

2.3.2 digital camera ✓ (1)

2.4 2.4.1 on the motherboard ✓ /CPU chip/HDD controller ✓ (1)

2.4.2 Holds the instructions ✓ that are likely to be used next by the processor ✓ thus speeding up the processing time. ✓ (3)

2.5 2.5.1 Overclocking – the system clock ✓ is adjusted to run at faster speeds than it is designed for ✓ (2)

2.5.2 Clock multiplication – is when pulses of system clock are multiplied by a whole or by a fraction ✓ in order to obtain the desired clock speed of the component ✓ that needs it (2)

2.6 2.6.1 Does not lose data when power is off ✓ (1)

2.6.2 Flash – slower than RAM/non-volatile ✓ and vice versa (1)

2.7 Data is transferred on the rise and fall of the signal/data is transferred twice in once clock tick/Memory runs at half external speed internally ✓ (1)

2.8

<table>
<thead>
<tr>
<th>STATIC</th>
<th>Non volatile</th>
<th>Dynamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cache memory</td>
<td>Any flash memory device e.g. flash drive Memory stick Digital camera Portable music players Cell phones ROM (Any one) ✓</td>
<td>Main memory ✓</td>
</tr>
</tbody>
</table>

2.9 2.9.1 Electronic pathway of wires ✓ (1)

2.9.2 Data ✓ bus and address ✓ bus (2)
2.10 2.10.1 The communication of a device with the CPU/a device needs to get the attention of the CPU ✓

2.10.2 Printing needs to be done/input from keyboard/read from or write to memory/a previous request has been completed/an error has been detected on a device (Any one) ✓

2.11 2.11.1 Pipelining – a method of processing where the processor is able to read ✓ new instructions from memory ✓ before the instruction that is busy being processed is completely processed. ✓
Each instruction is divided into steps, partially processed. The circuits in the pipeline are designed to handle different steps of the machine cycle. When the pipeline is full a couple of instructions will all be in various stages of completion ✓

2.11.2 Selecting wrong instruction ✓– branch prediction ✓
OR
Waiting of one pipeline for another – data flow analysis and schedules/speculative execution – looking ahead of program counter and executing instructions likely to be needed next.

2.12 2.12.1 To perform all mathematical and logical functions ✓

2.12.2 CU ✓ – responsible for fetching and decoding instructions ✓
OR
Registers ✓ – temporary storage area within the CPU ✓

2.12.3 Fetch an instruction ✓, decode the instruction ✓, data transfer ✓, execution of instruction ✓

2.13 Software ✓ that allows the hardware to communicate with the operating system ✓

2.14 Point to point controller for direct access ✓ of main memory by the graphics controller ✓; High speed ✓
QUESTION 3: SYSTEM SOFTWARE

3.1 Date/time on computer/boot sequence/how fast computer reads from memory/whether or not cache is enabled/information about CPU/RAM type/chip set values/keyboard and devices installed (Any two) ✓ ✓ (2)

3.2 BIOS – to boot the computer ✓ and manage the flow of data ✓ between the operating system and the attached devices. (2)

3.3 3.3.1 Universal serial bus ✓ (1)

3.3.2 Automatically detects ✓ and loads drivers ✓ for new hardware (2)

3.3.3 Can supply power to other devices/can daisy chain up to 127 devices (Any two) ✓ ✓ (2)

3.4 3.4.1 Software that can be downloaded free of charge ✓ and the code can be changed ✓ by anyone (2)

3.4.2 LINUX ✓ (1)

3.5 Minimise turnaround time ✓
Maximise throughput ✓
Use resources efficiently ✓ (3)

3.6 Storage management – creating/updating/transferring a file, find(Open) the file (Any two) ✓ ✓ (2)

3.7 3.7.1 On hard disk ✓ (1)

3.7.2 Allows the computer to think that there is more RAM available than there really is and so can hold more instructions which speeds up the processing.

OR

Instructions that are not used that often are moved from virtual memory to RAM as needed. (2)

3.8 3.8.1 Multitasking – operating system appears ✓ to be working on more than one process at a time ✓ (2)

3.8.2 Hyperthreading – ability of operating system to execute different parts ✓ of one program simultaneously ✓ (2)

3.8.3 Thrashing – when computer is trying to do too many tasks ✓ at once and stops responding ✓ /hard drive light is flashing (2)

3.8.4 Error terminating compiler – stops the program from compiling ✓ when the first error is detected which must be corrected before program can be recompiled ✓ (2)
3.9 Organise hard drive/empty recycle bin/remove temporary files/store serial numbers away safely/uninstall programs/run scan disk/disk cleanup/disk defragmenter  
(Any two) ✓ ✓  
(2)

3.10 3.10.1 It is a virus that attaches itself to a .exe or .com file ✓.  
It separates itself from the file and stays in memory ✓ when the program is complete. It monitors/copies and attaches itself to other such files. ✓  
(3)

3.10.2 To make the virus unavailable to the operating system. Keep it in a 'safe' place so that it cannot cause any more harm.  
(1)

3.11 3.11.1 An operating system for a hand-held device ✓  
(1)

3.11.2 Palm OS/windows ME/Windows 7 Mobile/Symbian  
(Any one)  
[36]

QUESTION 4: DATA COMMUNICATION

4.1 Sharing peripherals, sharing data, up to date data, access to the Internet  
(Any two) ✓ ✓  
(2)

4.2 4.2.1 Full duplex ✓  
(1)

4.2.2 ADSL ✓  
(1)

4.2.3 Synchronous ✓  
(1)

4.3 4.3.1 Star – easy to troubleshoot, easy to add more nodes, if one computer stops working the network will still function.  
(Any two) ✓ ✓  
(2)

4.3.2 Ring – no computer can monopolise the network, if device fails all those after it also fail, difficult to troubleshoot, adding and removing computers disrupts network.  
(Any one) ✓  
(1)

4.4 Fibre Optic – do not radiate energy, thin and lightweight, complex to install, connections require high precision, cannot be joined to other cables, less susceptible to EMI and eavesdropping.  
(Any one) ✓  

UTP – cheap, easy to lay, easy to replace  
(Any one) ✓  

If money is not an issue, the fibre optic as it is modern technology else UTP would be sufficient for the school ✓  
(3)
4.5 4.5.1 Gateway – can interpret and translate different communication protocols that are used on 2 different networks so that communication can occur

4.5.2 Router – links 2 networks that do not have identical architecture, able to determine best possible path to send info, make network more secure can connect LAN to WAN

4.6 Microwave ✓ – support high data rates✓
Radio waves✓ – can broadcast in all directions✓, stations can be mobile, transceivers are inexpensive

4.7 4.7.1 Voice over the Internet Protocol ✓
4.7.2 Can use fax and surf the net at the same time/Use voice and digital data at the same time/Cheap phone calls via Internet ✓

4.8 The amount of data that can be transferred✓

4.9 4.9.1 Line switching – a dedicated channel ✓ of communication is established between the sender and receiver for the duration of the transmission ✓

4.9.2 Transmission in real-time e.g. video, audio/normal phone calls✓

4.10 Fixed sized ✓ pieces of data (53 bytes). Each cell is filled ✓ to 53 bytes. Contains basic path information ✓ which allows fast routing ✓ (Any three)

4.11 4.11.1 A set communication rules✓ and procedures for transmission of data ✓

4.11.2 FTP – transmission of all files✓ from one computer to another ✓

4.11.3 A method whereby asynchronous modems ✓ check the validity of data. ✓

OR
A 1 or O is added to the data that is being transmitted and this is checked to determine whether there is an error or not.

4.12 UPS, RAID, backups (Any two) ✓✓

4.13 Set up user accounts
Delete user accounts
Security updates
Software update
Add more computers to network
Maintain network (Any two) ✓✓

[36]
QUESTION 5: SOCIAL IMPLICATION

5.1 5.1.1 Phishing – getting an e-mail requesting personal details✓
Identity theft – use of someone else's electronic details to commit a
crime e.g. open bank account using someone else's ID✓

(2)

5.1.2 SSL – secure sockets layer – allows secure/encrypted information
to be sent over the Internet using a browser✓
Digital signatures – unique sequence of bits appended to a website
or an e-mail to indicate that the author is authentic✓

(2)

5.2 Solar power
AD – once charged can work for a number of hours/do not need to use
electricity✓
DISAD – need to charge regularly in strong light/only work for a few short
hours✓

(2)

5.3 5.3.1 A place to meet friends on the Internet✓

(2)

5.3.2 Facebook/twitter/MySpace✓
(Any other correct answer)

(1)

5.4 Fingerprint scans, retinal scans, facial scans, blood flow in veins✓✓ – allow
access to secure areas✓/bank accounts✓, identify the person

(4)

5.5 A website that promotes/supports a particular ideology e.g. Green Peace✓

(1)

5.6 Recycle old computer parts if in working order/use old computers for teaching
literacy/as servers for a small LAN/reclaim poisonous substances
(Any two reasonable suggestions)✓✓

(2)

5.7 Computer ethics – the way in which people✓ make use of the information
and data on computers✓, safety of passwords

(1)

5.8 5.8.1 Card with electronic chip✓

(1)

5.8.2 Faster – do not have to stop at toll gates
Safer – do not have to carry cash
(Any possible answer)

(1)

QUESTION 6: DELPHI/TURBO PASCAL

6.1 61✓✓

(2)

6.2 36✓✓

(2)
QUESTION 7: DELPHI/TURBO PASCAL

7.1  7.1.1 reset (myfile) ✓
     7.1.2 seek ✓ (myfile,22 ✓);
     7.1.3 truncate ✓ (myfile) ✓;
     7.1.4 intToStr (iYear) ✓;

7.2 if (mydata.sTitle ✓ [1] ✓ = inputchar ✓ then red.lines.add(mydata.sTitle) ✓
     OR
     Then writeln(mydata.sTitle)

7.3  7.3.1 For p := 1 to 29 ✓ do ✓(loop)
     If marray[p] ✓ .iYear ✓ = marray[p+1] ✓ .iYear then marray[p] ✓ :=
     " ✓;
     OR
     For p := 30 downto 2 do
     If marray[p].iYear = marray[p-1].iYear then marray[p]:=";
     OR any other working solution

7.3.2 To send changed ✓ data back to the main program ✓

7.3.3 Value parameter – a variable used in the argument that does not change value
     A reference parameter – refers a value from the main program to the function or procedure and can change its value

7.4 An array holds a set of information in boxes. ✓
     This sort starts to compare the information in the first box ✓ with the information in the second last box. ✓
     If the alphabetical order is incorrect ✓ the contents of each box are swopped ✓.
     The process is repeated until all boxes have been compared with each other ✓.
QUESTION 8: DELPHI/TURBO PASCAL

8.1 Answer := false

8.2 (Suitable variable names should be used)

8.2.1 assign ✓ (cars ✓,'MyCar.txt' ✓ )
    OR assignfile(cars,'MyCar.txt')
     (3)

8.2.2 Richedit1.lines.add('Kilometres per litre') ✓
    OR Writeln('Kilometres per litre')
     (1)

8.2.3 Readln(cars ✓,oneline) ✓

8.2.4 Place:=pos('#' ✓ ,oneline) ✓

8.2.5 mycar:= copy(oneline ✓ ,1 ✓ ,place-1 ✓);
     (3)

8.2.6 Delete(oneline, 1,place); ✓
    Place:=pos('#' ,oneline) ✓
    km:= copy(oneline ,1 ,place-1); ✓
     (3)

8.2.7 Litre:=copy(oneline,place + 1,length(oneline)); ✓

8.2.8 Result:=km/litre; ✓

8.2.9 Richedit1.lines.add(sName ✓+',
    '+floattoStrF(result,ffFixed,5,2)) ✓
    (any form of real formatting)
    OR Writeln(sName+ ' '+float(result,5,2))
    (2)

TOTAL: 200