

GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

COMPUTER STUDIES HG
(Second Paper: Theory)

POSSIBLE ANSWERS OCT / NOV 2006

QUESTION 1
BINARY LOGIC

1.1

X	Z	XOR
0	0	0
0	1	1
1	1	0
1	0	1

(2)

1.2 $F(w,x,y,z) = S(4,5,6,13,14)$

(2)

1.3 $F(a,b,c) = ac(b + b') + a b'c'$ or $abc + ab'(c + c')$
 $= ac.1 + a b'c'$ $= abc + ab'$
 $= a(c + b'c')$ $= a(bc + b')$
 $= a(c + b')$ $= a(c + b')$
 $= ac + ab'$ $= ac + ab'$

(4)

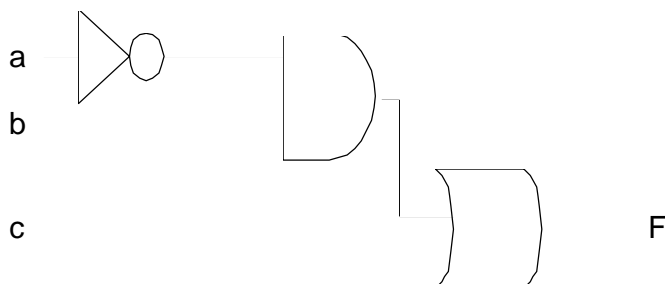
1.4

ab \ cd	00	01	11	10
00				
01	1	1		1
11	1	1		1
10	1			

 $F(a,b,c,d) = bc' + bd' + ac'd'$

(6)

1.5

(2)
[16]

QUESTION 2
COMPUTER ARCHITECTURE

- 2.1 The registers inside a 64-bit processor are 64 bits wide. It can handle larger chunks of data at a time than a 32-bit processor which has 32-bit registers. (2)
- 2.2
- 2.2.1 Hyperthreading – Improves the processing speed at any given time by allowing the processor chip to mimic the power of two processors. It appears as if more than one task is processed at the same time e.g. Word and spell check. (2)
- 2.2.2 Rendering – The process where an image is created by converting vector representations (triangles) to bitmaps in order to create a three-dimensional effect. Rendering is done by the video card and must be done for each pixel. Therefore the 3D-video must have a powerful processor and enough RAM. (2)
- 2.2.3 Firewire – A serial communication standard (a type of serial port which operates and is wired according to the IEEE 1394 specification) which allows devices to transfer data at high speeds – up to 400Mbps. Used to transfer digital video between the camera and the PC or from the PC to other external devices such as hard drives, CD writers, etc. (2)
- 2.3
- 2.3.1 Computer B – speed of processor, amount of primary memory, graphics card – One of above reasons. (0 marks if computer correct but incorrect reason) (1)
- 2.3.2 (a) Clock multiplication is when the pulses of the system clock are multiplied \ddot{u} by a whole or by a fraction in order to obtain the desired speed for the component that needs it. \ddot{u} (2)
- (b) Motherboard speed is slow. Allows processor to run at speeds greater than that of motherboard. (1)
- 2.3.3 256KB (1)
- 2.3.4 – memory chip must be compatible with motherboard – must be the correct type of memory (DIMM/RIMM)
– Make sure that the extra memory runs at the speed supported by the system clock of your computer (2)
- 2.3.5 DDR memory – Transfers data on rise and fall of clock pulse (1)
- SDRAM – clock is used to synchronise reading from and writing to memory (1)
- 2.3.6 USB
- to add up to 127 peripherals in a daisy chain (serial)
 - supports plug and play
 - hot swappable
 - Serial port specification (Any 3) (3)
- 2.3.7 AGP (1)

- 2.3.8 SATA uses serial cables instead of parallel cables. (1)
- 2.4
- 2.4.1 Pipelining is a method of processing where the processor is able to read ü new instructions from the memory before the instruction that is being processed is completely processed. ü (2)
- 2.4.2 (a) if..then..else – branch prediction was introduced – a method of guessing and then pumping the chosen paths instructions into the pipeline (1)
- (b) Data dependence – has made allowance for processing instructions out of order (1)
- 2.5 The way various bits of hardware communicatev with the CPU, e.g. ü keystrokes to let CPU know it needs to print, data has arrived that needs to be read, an error has been detected on an idle device 1+1=(2)
- 2.6 RISC – reduced instruction set – simple, single-operation instruction set (1)
- CISC – complex instruction set – single instructions that specify multiple operations (1)
- 2.7 Makes use of striping and error correction information to spread the data over more than one disc. ü The parity info of one disc is stored with data on another disc. ü Should a crash occur, it is possible to reconstruct data from the remaining stripes and the parity stripe. ü Performs better if implemented by controller card using its own processor to create parity. This controller card provides physical link to all drives. (3)
- [33]**

QUESTION 3 SYSTEM SOFTWARE

- 3.1
- 3.1.1 The original programming code is available. The code is open to scrutiny by a large number of users. Other people can participate in developing the operating system. (2)
- 3.1.2 Kernel is the mediator between the hardware and software. (2)
- 3.2.1
- Makes sure programs store data in different areas in memory. ü
 - Manages transfer of data between CPU, memory, printers. ü
 - Must make sure that at all times all programs fit into memory space otherwise it must create more space. ü (3)

- 3.2.2
- Controls the CPU
 - Controls storage
 - Controls peripherals
 - Manages security and the way programs gain access to resources (Any 3) (3)
- 3.3 NTFS – allows extra file attributes to be used, e.g. security status, access control for each file (1)
- 3.4 Virtual memory (1)
- 3.5
- 3.5.1 Translates or compiles the source code into machine language (1)
- 3.5.2 AD- does not have to compile the program each time as the exe file is stored. Therefore processing is faster. (1)
- 3.6
- 3.6.1 Multitasking (1)
- 3.6.2 Different tasks simultaneously in memory. Processing time is shared between programs. It seems as if more than 1 program is running at a time, but there is only 1 fast processor dividing its processing time between the applications. (3)
- 3.7
- 3.7.1 The BIOS loads configuration data from the CMOS to the RAM. The BIOS checks if all the hardware it expects to find are there and in working order. The BIOS starts a program called the bootstrap loader. (3)
- 3.7.2 Manages flow of data between operating systems and devices. (1)
- 3.8 When a lot of deleting and writing takes place, pieces of files are scattered all over the hard drive. Defrag puts all the pieces of the files on the hard drive into sequential order again. (2)

[25]

QUESTION 4
DATA COMMUNICATION

- 4.1 Can share hardware / peripherals, e.g. printers. Share software, centralisation of data, improved communication, security (Any) (3)
- 4.2 10/100Mbps NIC – for each computer to connect to the network / transfers data on network at 100 Mbps
100 Mbps Ethernet switch – all computers are linked through the switch – performs some network management and intelligent path selection/
Coaxial cables to connect all computers to the network, short distance, not too expensive.
(No marks for bridge because it is a LAN.) (3)
- 4.3 Modem (1)
- 4.4 When 2 LANS are working on different protocols (1)
- 4.5
- 4.5.1 C-ring (1)
- 4.5.2 Bus
- Simple and reliable to use in small networks
 - Easy to extend
 - Cheaper than star topology

OR

Star

- Easy to troubleshoot if one station fails
 - Easy to add another computer to the network. (Any 2) (2)
- 4.6
- 4.6.1 Faster, can phone and be connected to the Internet at the same time (1)
- 4.6.2 Packet switching – messages are broken up into smaller units called packets before they are sent and each packet may follow a different route on the network. Once all packets have arrived at the destination, they are reassembled into one message. Variable length packets can be sent. (4)
- 4.7
- | | | | | | | | | |
|-------|---|--------|---|-------|---|-------|---|-----------|
| 4.7.1 | H | 4.7.2 | E | 4.7.3 | A | 4.7.4 | R | |
| 4.7.5 | P | 4.7.6 | J | 4.7.7 | K | 4.7.8 | Q | |
| 4.7.9 | N | 4.7.10 | F | | | | | 10x1=(10) |
- 4.8 Web browser – navigating tool which allows one to explore the internet.
Search engine – index system which allows one to search and find specific info. (2)

- 4.9
- 4.9.1 URL – universal resource locator / the unique address of a webpage. You can instantly display a web page if you know its URL. All webpages URL's start with http. (1)
- 4.9.2 HTML – Hypertext markup language / language used to create documents on the WWW. (1)
- 4.9.3 SSL – secure sockets layer – a padlock at the bottom of screen – allows secure transactions between two computers over the Internet using a browser. It establishes a secure session using a unique session key to encrypt the data. (2)
- 4.9.4 Hyperlink – A built-in connection to another related Web page or Web site. It is indicated as text underlined in blue. (1)
- 4.9.5 Digital signature – a unique code generated by software and added to a message to identify the sender. (1)
- 4.10
- 4.10.1 Asymmetrical encryption – has a public key obtained from the recipient which allows for encryption and a private key known only to the recipient for decryption. The private key is a mathematical calculation derived from a public key. This method is more secure than symmetric encryption. The longer the key, the more difficult it is to break. Takes longer to encrypt and decrypt than symmetric encryption. (3)
- 4.10.2 Sending private information electronically e.g. banking details (1)
- [38]**

QUESTION 5 SOCIAL IMPLICATIONS

- 5.1 To safeguard company data against illegal electronic activities, give advice etc.
To assist employees to do legal transactions etc. on the internet
To ensure the company does not commit fraud or use illegal software
To fight court cases related to internet-related problems (Any 2) (2)
- 5.2
- 5.2.1 Spyware – software that gathers info about a person without their knowledge or accent. Can be sold to other companies or used to bribe people. (2)
- 5.2.2 Cookies – text files that contain info about websites that you have visited to find info. Can sell the names to companies. (2)
- 5.2.3 Phishing – when someone sends you an email requesting private or confidential information. Can use the information to steal money from their bank account. (2)
- 5.3
- 5.3.1 Welding robots – robots on the assembly line welding together the parts of the car.
Spray-painting robots – spraypaints new cars. (2)

- 5.3.2 Human skills such as giving advice or sales skills – convincing people to buy an item. (1)
- 5.3.3 A logic bomb is a program that executes a command after being initialized by a certain number or on a certain date. When run it can alter network settings, or your set-up. (2)
- 5.4
- 5.4.1 Have a form of processor built in that has input, process, output and storage capabilities. (2)
- 5.4.2 electronic purse / e-money (1)
- 5.5
- The computer can help learners to improve their reading abilities
 - The computer gives learners access to the internet (information) for school projects.
 - Educators can be shared. Lesson is presented via the internet to schools without educators. (Any 3) (3)
- [19]**

QUESTION 6 DELPHI / TURBO PASCAL PROGRAMMING

- 6.1.1 `function ChangeToCaps(var Pword:string): string;`
`Var I : integer;`
`Begin`
`For I := 1 to length(Pword) do`
`Pword[I] := upCase(Pword[I]);`
`ChangeToCaps:=Pword;`
`End;` (4)
- 6.1.2 (a) `p,n,sum, I : integer;`
`Newword, ans : string;` (2)
- (b) `Randomize;` (1)
- (c) `Sum := 0;` (1)
- (d) `for I := 1 to length(Pword) do P`
`Sum := Sum + ord(Pword[i]); PPP` (4)
- (e) `While length(newWord) < 6 do PP`
`begin`
`n := Random(Length(Pword))+ 1; PPP`
`If n <= length(Pword) then P`
`Newword:= NewWord + Pword[n] ; P`
`end;`
- OR `for i: = 1 to 3 do begin Pv`
`n: = Random (length (Pword)) +1; PPP`
`if n <= length(Pword) v then Newword: = Newword +`
`Pword[n] P;`
`end` (7)
- [19]**

QUESTION 7
DELPHI / TURBO PASCAL PROGRAMMING

7.1

7.1.1

Type

```
TNames = array[1..5] of string;
```

(2)

7.1.2

Reference parameter

- sent from main program to procedure or function and returned changed to the main program. It has the keyword *var* to the left of the parameter. Two-way communication e.g. var Posi:integer

(2)

Value parameter

- sent from main program to procedure or function and returned unchanged to main program. The value is not returned e.g. names or sname

(2)

7.1.3

XYZ(Names, SName, Posi);

(3)

7.1.4

B	T	M	iPosi	bFlag	(B<=T) and (NOT bFlag)?	Names[M] > sName?	Names[M] < sName?
1	5		0	False			
					Yes		
		3				Yes	
	2				Yes		
		1				No	Yes
2					Yes		
		2				No	
			2				No
				True			

(8)

(a) Binary Search

(1)

(b) The names in the array must be sorted in alphabetical order before this search procedure can be applied successfully.

(1)

- 7.2
- 7.2.1 comma should change to ; ü (1)
- 7.2.2 declare total as an integer ü (1)
- 7.2.3 rainfall is not declared under var and cannot be used.
Declare: var rainfall : arrRain; üü (2)
- 7.2.4 val(Rainfall[row,col],irain,code); Delphi :... + StrToInt(Rainfall[row, col]);
week := week + iRain; Delphi Rainfall [col,8]:= IntToStr(week); (2)
Str(week, sweek); ü
Rainfall[col,8]:= sweek
- 7.2.5 change type arrRain = array[1..9,1..6] of str4; ü (1)
- 7.2.6 str(total,Rainfall[8,Col]); ü
Delphi : Rainfall[8,Col] := IntToStr(total); (1)
- 7.2.7 the variables row and col must be swapped in lines 5 and 7 for the correct info
to be added ü
Statements 10 and 11 must be above the end (statement 9)ü
Statement 12- Rainfall[8,Col] := IntToStr(Week); ü (3)
- [30]**

QUESTION 8 DELPHI / TURBO PASCAL PROGRAMMING

- 8.1 seek(DataF,2) üü
read(DataF,Rec) ü (3)
- 8.2 Writeln(filesize(DataF)); or lblOutput.Caption := IntToStr(filesize(DataF)); (1)
- 8.3
- 8.3.1 If reset is used the file pointer is set to the beginning of the file and the search
will take place. (2)
- 8.3.2 If rewrite is used the file will be cleared and the file will be empty so nothing will
be found during the search. (2)
- 8.4 (a) Seek(DataF, filesize(DataF)); üü (2)
- (b) Rec.Name := copy(sLine,1,pos('@', sLine) - 1) üü
Delete(sLine,1,pos(' ',sLine)); üü
Rec.Areacode := copy(sLine,1,3); üP
Delete(sLine,1,4); ü
Rec.Tel := sLine; ü (8)
- (c) write(DataF, Rec); üü (2)
- [20]**

TOTAL: 200