GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

COMPUTER STUDIES HG
(Second Paper: Theory)

POSSIBLE ANSWERS / MOONTLIKE ANTWOORDE SUPP 2007

QUESTION 1

1.1	D	1.6	C	
1.2	A	1.7	B	
1.3	A	1.8	D	
1.4	C	1.9	C	
1.5	D	1.10	D	**[10]**

QUESTION 2
BOOLEAN ALGEBRA

2.1

	C'	**C'**	**C**	**C**	
	00	**01**	**11**	**10**	
A' 00	1		1	1	B' 00
A' 01			1		B 01
A 11					B 11
A 10	1	1	1	1	B' 10
	D'	**D**	**D**	**D'**	
	00	**01**	**11**	**10**	

(4)

$F(a,b,c,d) = ab' + b'c + bd + a'cd$ (2 x grouping , 2 for answer)
(-1 if extra terms)

2.2.1 $F(A,B,C) = AB'C' + ABC' + ABC$ (2)

2.2.2 $F(A,B,C) = AB'C' + ABC' + ABC$
                  $= AC'(B' + B) + ABC$
                  $= AC' + ABC$ P
                  $= A(C' + BC)$
                  $= A(C' + B)$ PP   (3)

2.3   1011 + 1110

Full Adder circuit showing: inputs 1 1 0 1 1 1 1 0; four Full Adders with carry-in values 1, 1, 1, 0; each with C and S outputs; Sum result 1 0 0 1
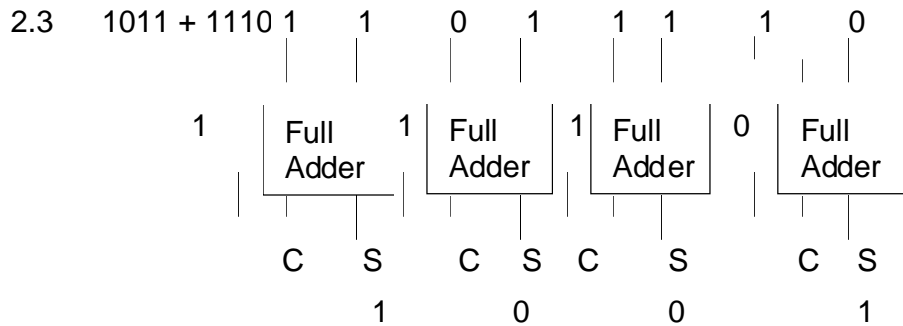
Allocation of marks:	Two input – half adder	(1)
	Three inputs – full adder	(1)
	One half adder and more than one full adder	(1)
	Each adder has a Sum and Carry as output	(1)
	A final correct binary answer	(1) **(5)**

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QUESTION 3
COMPUTER ARCHITECTURE

3.1

3.1.1   (a) Cache memory is high-speed memory that is used to temporarily store data or instructions that are most likely to be used next by the processor in the running of a program.   (2)

(b) Expensive / size   (1)

3.1.2   (a) Setting the system clock to run at faster speeds than what it is designed for.   (1)

(b) Generation of heat that could lead to CPU burn-out.   (1)

3.1.3   Pipelining is the method of processing where the CPU is able to read instructions from memory before the instruction that is busy being processed is completely processed.   (3)

3.1.4   (a) Data bus   (1)

(b) The wider the bus, the more data can be carried at a time. CPU receives data faster which improves the operating speed.   (1)

3.1.5   The smaller the transistor, the more transistors can fit onto a chip which makes the CPU more powerful. Smaller transistors switch faster. More circuitry, registers, maths and logic units, etc. can fit onto the CPU.   (3)

3.2   more memory, mouse, graphics card, flat screen, joystick, sound card   (any 2)   (2)

3.3

3.3.1   AGP – accelerated graphics port

          USB – universal serial bus   (2)

3.3.2   plug and play , hot swappable, can connect up to 127 devices daisy chained

          into a USB port   (any 2)   (2)

3.3.3   (a) USB2 – faster   (1)

          (b) Digital photography, broadband Internet access   (any 1)   (1)

3.4

3.4.1   Hyperthreading:

          (a) one computer is treated as if there are 2 CPUs   (1)

          (b) True multiprocessing – faster speed   (1)

3.4.2   SCSI

          (a) small computer systems interface – serial connection – controlling circuitry

              on a card that can be plugged into an ISA or PCI slot   (1)

          (b) multipurpose connection for high-speed storage in servers, can connect up

              to 7 peripherals   (1)

3.4.3   FIREWIRE

          (a) serial communication link, controlling circuitry either on motherboard or

              plug-in card   (1)

          (b) for high speed data capturing – e.g. digital video   (1)

3.4.4   PCI express

          (a) Allows components on the motherboard to talk with one another – joins

              internal and external busses in one   (1)

          (b) Improved technology to cope with faster graphics, faster hard drives and

              faster CPU's – switch is an intelligent device that connects each

              component together and sends signals only to the intended recipient   (1)

3.5

RISC	CISC
Reduced instruction set code	Complex instruction set code
Simple, single-operation instruction set	Combines several simple instructions into complex instruction
Instructions of the same length	Varying lengths for instructions
Faster to process more frequently used instructions	Complex instructions are processed faster

(any 2)   (2)

3.6
3.6.1   A register is used to hold the addresses of instructions and data. It also holds the data that the CPU is working on currently.   (1)

3.6.2   The number of registers that a CPU has and the size of registers.   (2)

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QUESTION 4
SYSTEM SOFTWARE

4.1
4.1.1   OS – set of programs that monitor and control all hardware and software activities on the computer and allows you to interface with it.   (3)

4.1.2   (a) Makes sure that the time between the giving of instructions to the computer and the time till something happens is as small as possible.   (2)

  (b) Maximise throughput or provide security or efficient utilisation of resources   (2)

4.1.3   A program that allows hand-held devices to operate – operating system is embedded on the ROM chip   (2)

4.1.4   PALM OS, Windows CE, Pocket PC OS   (1)

4.2   Virtual memory – space that is found on the hard drive to act as memory. The computer thinks that there is more memory than is actually the case and it breaks the program into segments and moves these between the hard drive and the RAM where necessary.   (3)

4.3
4.3.1   Buffer – temporary storage space in primary memory where items are stored while waiting to be sent to an output device.   (2)

4.3.2   Spooler – program that places jobs in a queue and is used when a large amount of data is being sent to a slow output device.   (2)

4.4
4.4.1   Translates or compiles a program into machine language   (2)

4.4.2   DELPHI, Turbo Pascal, Fortran, VB,C++   (1)

4.5
4.5.1   Multiprocessing   (1)

4.5.2   The tasks are in the internal memory of the CPU at the same time. Slices of
        processing time are being allocated to the different tasks in rotation.   (2)

4.6
4.6.1   When real-time processing takes place, changes are immediately visible. The
        system is continually interacting with the user. Requests are acted upon
        immediately.   (2)

4.6.2   E.g. controlling space shuttle, nuclear power stations, airline bookings, ATM
        banking systems   (1)

4.7
4.7.1   Date and time of creation, size of file, read only, hidden, system   (2)

4.7.2   A method of chaining is used. – the start FAT entry is stored and using the
        FAT, the operating system can easily link the segments of the file chain that
        are connected.   (2)
                                                                                 [30]

QUESTION 5
DATA COMMUNICATION

5.1
5.1.1   (a) GPRS – general packet radio service   (1)

        (b) MMS – multimedia service   (1)

5.1.2   (a) GPRS

                –   always connected to the Internet
                –   pay only for packets that are sent and received
                –   browse, search and email on the move
                –   use higher rate of data transfer than standard telephone lines (any 2)   (2)

        (b) MMS
                –   send and receive videos / pictures   (1)

5.2
5.2.1   Data is broken up into smaller units called packets. Packets may follow
        different routes through the network. Once all packets (sent individually) arrive
        at the destination, they are reassembled into the original data. Packets may
        have different lengths with a strict maximum length.   (5)

5.3

5.3.1 Passwords must be changed after a certain time, restrict time of access to the system, limit the rights and access to certain files and directories, delete users that no longer work at the company. (3)

5.3.2 Prevent unauthorised access to or from a private network. Prevent Internet users accessing private networks. (2)

5.4

- ADSL – permanent open connection, more downstream bandwidth than upstream. (1)

- can phone and fax / Internet at same time. (1)

5.5

5.5.1 (a) Switch – repeats and strengthens signal, receives data and sends to specific device saving time and improving performance. (2)

(b) Works effectively with bandwidth / decreases network traffic. (1)

5.5.2 (a) Can connect through walls and further than infra red (± 10 m) (1)

(b) hands free car kit or use cellphone as modem to connect laptop to the Internet. (1)

5.5.3 Client – Do not provide any resources, rely on servers for resources
Server – Only provides the network with resources. (2)

5.5.4 CSMA / CD

– can send whenever you want to
– a workstation that wants to send a message, listens for traffic before transmitting
– if no traffic, transmission can begin
– message is broadcast to all workstations
– must check whether there is a collision
– if there was a collision, workstation waits and then tries again (4)

5.6

5.6.1 ATM – asynchronous transfer mode (1)

5.6.2 Packets of the same size, 53 byte cells are sent. If data is less than 53 bites, buffering takes place to fill the cell (1)

[30]

QUESTION 6
SOCIAL IMPLICATIONS

6.1
6.1.1 (a) Sniffer – capture data passing through a wireless network – used to detect user names and passwords (1)

(b) Phishing – an e-mail requesting personal info – someone claiming that they are checking your data and request a response (1)

(c) Social engineering – gain a person's trust to extract info or gain access to their computer (1)

6.1.2 Encryption – encoded data

Digital certificates- supplied by certification company to verify that site or software is what it is claiming to be

Digital signatures – unique sequence of bits generated by software and added to a message

Secure sockets layer – padlock visible at bottom of screen – on accessing a site, digital certificate is sent, unique session key generated and encoded. (2)

6.1.3 Investigate and check computer web sites for compliance with the law (1)

6.2
6.2.1 Voice over the Internet protocol (1)

6.2.2 Cheap international phone calls – pay for local connection only (1)

6.3 SPAM
– do not reply to advertising emails
– be careful when filling in forms on the Internet where blocks have automatically been ticked
– use different email addresses when working on websites that you do not know well (2)

6.4
6.4.1 Do not have to pay for it. Can download free of charge, can change it, can reproduce it, can modify it (2)

6.4.2 Linux (1)

6.5
6.5.1 Someone who does business over the internet (1)

6.5.2 Many people have access to your goods
Can advertise on net
Cheaper than renting office space (Any 2) (2)

6.6
6.6.1   A card with memory chip that can record, change information   (1)

6.6.2   Taxi cards – safer for passengers

        Cell-phone cards – some cards can perform banking transactions

        Electronic purse- safer – don't have to carry cash, don't have to qualify for a
        card, lessens risk of robbery, difficult to duplicate
                                                                     (any 1)   (2)
                                                                                   [19]

QUESTION 7
DELPHI / TURBO PASCAL PROGRAMMING

7.1   Valid – all data of the type declared by the variable will be accepted
      Correct – data within the requirements – only M or F   (2)

7.2   p;= pos('easy',sSen); P
      delete(sSen, p,4); P
      insert ('difficult', sSen,p,4)' PP

7.3   (4)

i	j	k	flag	K<=5 AND flag = 0?	FN[j]	FN[k]	Is Fn[j] = FN[k]?	Is flag = 0?	Ans[i]
0	1	2	0	Yes					
					4	7	No	Yes	
		3		Yes					
					4	5	No	Yes	
		4		Yes					
		5	1		4	4	Yes	No	
	2	3	0	Yes					
					7	5	No	Yes	
		4		Yes					
		5		Yes	7	5	No	Yes	
1			1		7	5	No	Yes	7
	3	4	0	Yes					
					5	4	No	Yes	
		5		Yes					
					5	5	No	No	
2	4	5	0	Yes					
			1		4	5	No	Yes	4
3									5

                                                                                  (7)
                                                                                  [13]

QUESTION 8
DELPHI / TURBO PASCAL PROGRAMMING

8.1

8.1.1
```
sum := 0;
for col := 1 to 4 do
sum := sum + numarray[3,col];                                        (4)
```

8.1.2
```
large:= numarray [1, 1]; P
for I : = 1 to row do P
        for j : = 1 to col do P
             if numarray[row,col]> large then large :=numarray[row,col]
        end;                    P                        P
end;                                                                 (5)
```

8.2

8.2.1   variable – has a var in front to take back a changed value   (2)

8.2.2   between begin of procedure and while statement.   (1)

8.2.3

(a)
```
line : string[80];
letters,vowel:integer;
avg: real                ü ü                                          (2)
```

(b)
```
assign(t,'c:\STORY.TXT')    assignfile(t,'c:\STORY.TXT') ü ü          (2)
```

(c)
```
reset(t)   ü                                                         (1)
```

(d)
```
readln(t, line);            ü
for I : = 1 to length(line) do      ü
    ü           ü                      ü            ü
  if upcase(line[i]) in ['A', 'E', 'I', 'O', 'U'] then inc(vowel)
else
        ü           ü                              ü
  if not(upcase(line[i])) in ['!','@','#','$','%','&',',',':',';','?'] then inc(letters);   (9)
```

(e)
```
avg:=vowel/(vowel+letters) *100            ü ü                        (2)
```

(f)
```
close(t)      OR closefile(t);      ü                                 (1)
```
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QUESTION 9
DELPHI / TURBO PASCAL PROGRAMMING

9.1
9.1.1   seek(motor,3);   üü
           read(motor, motordata); ü   (3)

9.1.2   function Fullname (X : motordata):Boolean; üüü
           Begin
           ü ü   ü   ü
           If length(x.sname) > 1 then modify :=true else modify :=false;
           End;   (7)

9.2   Var
         a , I, r : integer;
       Begin
       Randomize;
       A:= count div 30;   ü
       Showmessage('There will be '+inttostr(a)+ 'learners');   (3)
                 OR   üü
       Writeln('There will be '+a+'learners');

       For I : = 1 to a do begin   ü
           R : = random(30)+1+(i-1)*30;   üüü
       Selectd[i]:=learn[r];   üü
       End;   (6)

OR

     K : = 0; ü
     While K < iNumber do ü
     begin
         R : = Random(30)+1; ü
         If Learn[R] <> ' ' then ⎤
         Begin   ⎬ P
           Inc(K);   ⎦
           Selectd[K]:= Leam[R];ü
           Learn[R] := ' '; ü
         End;
     End;

     For I := 1 to a do
        Writeln(selectd[i]);   üü
      OR
      redOutput.lines.add(selectd[i]);   (2)
                         [21]

TOTAAL: 200