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COMPUTER STUDIES 2- THEORY (FORM IV) NOV 2001
(For Both School and Private Candidates)

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SECTION A (10 Marks)

Answer ALL questions in this section

(i) Hardware for a computer system is similar to
A. The instructions that are given to a clerical system
B. The equipment in clerical system
C. The input data that is used in a clerical system
D. The output that is generated from clerical system
E. The file cabinet in the clerical system

(ii) Second generation computers used
A vacuum tubes
B diodes
C integrated circuits
D Transistors
E capacitors.

(iii) Another name for temporary storage is
A secondary storage
B auxiliary storage
C Floppy diskette storage
D magnetic tape storage
E main storage

(iv) one byte is approximately equal to
A one character
B one word
C one megabit
D eight character
E half the random access memory

(v) The number system on which the operation of he computer is based is
A hexadecimal system
B decimal system
C binary system
D octal system
E pental system.

(vi) Output from a printer is normally called
A A printer copy
B A soft copy
C a photocopy
D An electronic copy
E A hard copy.

(vii) syntax is
A a technique for writing programs in BASIC
B a problem solving technique used by high-level languages
C a program in BASIC that will always give errors when executed
D a set of rules that a programmer must follow in writing a particular program
E not a factor to consider in developing high-level programming languages.

(viii) computer programs can be written in
A machine language
B assembler language
C symbolic language
D octadecimal language

E Ordinary language.

(ix) the difference between data and information is that
A data always contains information
B data has context while information has not
C information and data are one and the same thing
D minor.

(x) The most important impact of the second generation of computers was
A widespread unemployment among white-collar workers
B the development of standardized programming languages
C the development of integrated circuits
D the introduction of Internet an world wide web
E the evolution of timesharing.

SECTION B (10 Marks)

2. Match the items in list A with the responses in list B by writing the letter of the correct response beside the item number.

List A

(i) Computer system
(ii) Input
(iii) File
(iv) Disk
(v) Data element
(vi) Information
(vii) Secondary storage devices
(viii) Central pressing unit
(ix) Computer
(x) RAM

List B

A an example of direct storage device
B the component of a computer system where programs and data are stored when not in use.
C a tangible piece of paper or form which data are input to a computer system.
D A collection of related fields.
E A processing methods allowing data to be processed fast enough to facilitate the decision-making Process.
F A memory reserved to function as temporary storage area during processing.
G a set of related records
H A set of related records
H A general name use to describe data transfer operations arithmetic operations arithmetic operations and logic operations
I Includes hardware software, data and people
J Involves capturing or obtaining the original data.
K A type of Arithmetic operations where numerals are acted upon all at once.
L A basic element of Information representing facts concepts or instructions in a form suitable for communication, interpretation and processing.
M The Circuitry that performs addition on data received.
N Part of the computer system that interprets instructions, performs calculations and directs the input, storage and output operations.
O An instrument capable of directly encoding physical event into data
P One thousand characters of storage
Q An element of data such as pay rate
R A meaningful collection, organization and presentation of data for an intended recipient
S The space on a magnetic tape between groups of records
T An electronic device capable of accepting alphanumerical input data, processing the data according to prescribed instructions, storing the data and providing suitable output

SECTION C (40 MARKS)

Answer ALL question in this section.

3. (a) with the aid simple sketches briefly describe the difference between digital and analogue signals
(2 marks)

(b) state two advantages of database.
(2 marks)

4. computer viruses are a major threat to security of data.
(2 marks)
(a) what is a computer virus?
(2 marks)
(b) how do viruses move from one machine to another? (2 marks)

5. (a) make a list of four generations of computers.
(4 marks)
(b) what were the disadvantages of the first generation? (4 marks)

6. Improper use of personal data stored in computers has led to many countries to introduce laws to protect and provide those individuals with certain rights. What

rights do individuals have in respect of any stored data about them? (4 marks)

7. What are the advantages of high-level languages over low level languages?

8. Make a list of the main components of a computer system.

9. Figure 1 below shows part of an Excel worksheet. Calculate the worksheet and provide the following information:

(a) Total value of RED dresses sold in the three days (2 marks)

(b) the number of dresses (all colours) sold on Monday (Mon). (2 marks)

	A	B	C	D	E	F	G	H
1	D R E S S S A L E S							
2								
3	Colour		Mon	Tues	Wed	Total sold	Unit price shs	Valu e
4								
5	Black		100	20	50	=C5+D5+E5	50	=G5 *F5
6	Red		50	150	20		70	
7	blue		10	30	50	=C7+D7+E7	70	=G7 *F7
8	Green		20	20	80	=C8+D8+E8	60	=G8 *F8
9	Brown		10	10	60	= C9+D9+E9	80	=G9 *F9
					=sum (E5:E9)			
11			=Sum (E5:E9)					

10.define modem and state its functions. (4 marks)

11. Modem telecommunication offers facilities for voice, test and image transmission list any four means of text transmission. (4 marks)

12. Convert the binary number 101110011111 to
(a) octal (2 marks)
(b) hexadecimal. (2 marks)

SECTION D (40 Marks)

Answer FOUR (4) questions this from this section.

13. (a) (i) COBOL is a short form of "common Business Oriented Language." Write the long form of BASIC. (2 marks)

(ii) in which level of programming languages is BASIC grouped? (1 mark)

(b) write the BASIC equivalents of the following expressions:

(i) $\frac{3}{4}\pi r^3$ (1 mark)

(ii) $\frac{-b+\sqrt{b^2-4ac}}{2a}$ (2 marks)

(c) write a simple program to calculate the area A of a circle, given that π = P =3.14159 and R, the radius of the circle. Include comments to explain the meaning of the variables.

(d) What do line numbers stand for in BASIC programming? (1 mark)

14. (a) (i) what is the difference between a constant and a variable?

(ii) in BASIC, the two expressions 21304 and "21304" are not the same.What are their names? (4 marks)

(b) Assign the expression $(F-32)*\frac{5}{9}$ to a single variable in BASIC code.(1 mark)

(c) the following is a two-line programmer in BASIC:

10 PRINT "ADD 2 AND 2"

20 PRINT 2 + 2

What will the output for each line be? (2 marks)

(d) Write a four-line program which will print your name in full. Name the program "MY NAME PROGRAM." The result should contain the sentence "MY NAME IS……(3 marks)

15. (a) (i) what is the name of a statement that is used for unconditional branching? (1 mark)

(ii) here is a simple program.

```
10 PRINT "BANANAS"
20  GO TO 10
30 END
```

What will the results be when it is run? (2 marks)

(b) Write the output of the following program:

```
10 FOR X = 10 TO 1 STEP –1
20 PRINT X
30 NEXT X
40 PRINT "LIFT OFF!!!"
50 END
```

(2 marks)

(c) Consider a BASIC program which contains lines 20 and 50. write a statement that will cause the computer to skip to line 50 whenever T is 9. (2 marks)

(d) The following is one loop inside another loop:

```
FOR A = 1 TO 10

        FOR B = 2 TO 6

NEXT A

            NEXT B
```

Is this a valid BASIC program? If not, what is wrong with it? (3 marks)

16. (a) (i) what is an array? (3 marks)

(ii) write down an array named Z with 15 elements using BASIC language. (1 mark)

(b) an array N$ contains the names of 50 children and an array A contains their corresponding ages in years. Note that the names are different but some children's ages may be similar. Explain what the following program segment does.

```
100     INPUT   X$
110     FOR i = 1 TO 50 Step  1
120     IF  N$(i) = X$ THEN  140
130     NEXT i
140     PRINT N$ (i), "IS," A(i); "YEARS   OLD"
```

(3 marks)

(c) assign to the first 10 consecutive elements of an array P the odd number values 1,3,5,… (3 marks)

17. (a) (i) what does the READ statement tell the computer to do? (2 marks)

(ii) what does the RESTORE statement mean to the computer when it is used in a BASIC program? (2 marks)

(b) write a BASIC program that reads in a number less than 64 and then prints the five digits of the binary representation of that number. (6 marks)

18. (a) (i) what is a routine? (1 mark)

(ii) Name one common advantage of functions and subroutines in BASIC language. (2 marks)

(b) mention and briefly explain the two main types of functions. (4 marks)

(c) the following is a subroutine for converting degrees fahreiheit into degree celcius which is being used by the main program:

```
100 REM SUBROUTINE TO CONVERT F
FAHREINHEIT

110 REM INTO C DEGREES CELCIUS

120 C = 5* (F – 32)/9
```

Explain what is wrong with the above subroutine. (3 marks)

(d) name a statement that will instruct a program to use a subroutine after the program has reached a certain stage. (1 mark)

SOLUTIONS SCHEME

1.
(i) B
a hardware is any physical component making up a (A) computer system. Instructions given to clerical system is similar to programs used in a computer system, therefore they do not belong to hardware. The equipment in clerical system is similar to hardware in a computer system.(B)
Input used in clerical system (C) is similar to data which is fed into computer thus cannot be called a hardware. The output that is generated from clerical (D) system is similar to the output from the processed data in computer system which can be either a soft copy or hardcopy and again it is not hardware. And file cabinet in clerical (E) system is similar to the Hard Disk a computer system and is only part of the hardware. So (B) is the best answer.

(ii) D.
Second generation computers were characterized by the introduction of assembly language using symbolic codes (mnemonics) and the circuits were made up by transistors (D) instead of vacuum tube (A) as used in the first generation. Integrated circuits IC's(C) powered the third generation computers together with high-level languages. Diodes and capacitors (B,E) were not major inventions forming the basis of any generation of computers.

(iii) E
Temporary storage is the type of memory which is active only when the computer is still on and goes off when power is switched off. It's also referred to as main storage or Volatile memory. e.g. (RAM)(E)

Secondary storage or auxiliary storage is a permanent storage like diskettes storage or magnetic tape storage.(A,B,C,D)

(iv) A
A byte is made up of 8 bits i.e. combination of 0's & 1's is known as binary digits (bits)
One character is approximately equal to 8 bits. Which is one byte (A)

The length of a word(B) is variable ana larger than a byte.
One-megabyte means 1 million bytes.(C)

8 characters would be approximately equal to 64 bits and not one byte. Half a random access memory(E)is variable and machine independent . A standard PC in 2002 I likely to have 128MB RAM half of which woud be 64 MB RAM.

(v) C.
A number system refers to any system representing numeric values or quantities. Hexadecimal system is a number system using base 16.Decimal system is base 10 systems also known as denary system. Binary system is a base 2 number system which uses only 2 bits i.e. 0 and used by computers in their operations. Octal system is a base 8 number system . The pental system is not used as regards computers while Octal ,Hexadecimal and decimal systems are often used to represent binary numbers in a more readable manner of human beings

(vi) E
An output is a result produced by a computer to an output device. Softcopy (B) or electronic copy is what is displayed on monitors or stored in secondary storage while hardcopy(E) is what is generated by a printer. Photocopy(C) has no direct relation to a printer and a printer copy is not a proper computer term .

(vii) D
Syntax is set of rules that a programmer must follow in writing a particular program (D)
Syntax is not a technique for writing programs in BASIC (A) since syntax is a feature of any programming language and not just BASIC
It is not a problem solving technique (B) since it pertains to specific grammars than Abstract techniques.
Its is not confined to program in Basic (C) but pertains to all Programming language
It is very relent to developing high level languages (B)
(viii)
E
Computer programs are sets of instructions used for computers to solve particular problems (tasks)
Wile it is true that computer programs can be written using, symbolic, machine language or assembly language but it is of great importance that high level languages use ordinary language . print "hello". This statement uses clear English . Octadecimal language is not a computer used to write programs.

(ix) C
Data is a basic fact unprocessed data and information is a processed data that is meaningful

Thus data is part of information and has no context of its own. Information then has context (i.e. meaningful) while data may not. And in this case data and information are not one and the samething. Therefore we cannot say that the difference between data and information is minor.

(x) B
Widespread employment among white(A) collar workers was not the important impact of the 2nd generation computers or any generation whie color workers came to be users of computers

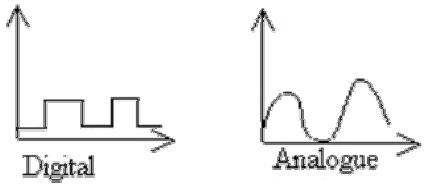
Development of standardized programming language become possible as programmers were now able to write programs easily using symbolic codes instead of the difficult machine language(B) in which programs were written entirely in numbers 0's & 1's and this was the major impact of the 2nd generation computers. Intergrated circuits(C)apeared in the 3rd generation and not in the 2nd generation and Internet (D)has developed very recently during the 90's thus not a product of the second generation computers and evolution of timesharing (E) were not possible before mainframe appeared I the 60's and 70's

Section B (10 marks)

2.Match the items in list A with the response in list B by writing the letter of the correct response beside the item number.
(i) - I
(ii) – J
(iii) –G
(iv) – A
(v) – L
(vi) – R
(vii) – B
(viii) – N
(ix) – T
(x) - F

Section C (40 marks)

3.(a) digital signals contain finite quantities while analogue signals have continuous quantities like temperature and pressure.
Why are digital signals so important for computer systems?
Why aren't analog signals used:
Digital signals are so important for computer systems due to the fact that those systems use only 0'se & 1's commonly known as binary digits, so whatever enters a computer system has be to converted to digital signals for further processing.



b) Advantages of database
Resource Sharing – inter departmental sharing is possible. Several departments can have access to a common database.

Security – users are assigned rights and privileges to certain type of information.
The security of a system is simplified due to central Administration.

4 (a) Computer Virus – Man made programs that destroy files and programs and can spread from one computer to another through Network nd infected floppy disks .

(b) When reading or opening infected mails/files through Internet or using infected floppies the programs called viruses copy themselves to the new media of the computer accessing those files.

5(a) First generations of computers – computers were programmed using machine language and circuit components were made using Vacuum tubes.

- Second generations of computers. Transistors replaced vacuum tubes while a new language, assembly language (symbolic language was used)
- Third generation of computers. IC's(integrated circuits) replaced transistors and high level languages were introduced.
- Fourth generation of computers. Large Scale IC's were used and 4GL's language also known as query languages were used

(b) Disadvantage of the first generation
- Computers were big and encompassed whole building for a single computer because of using Vacuum tubes overheating was a problem.

- The machine language which was used, was difficult and very hard to learn.

6. Individuals have many rights in respect of any stored data about them.

Some of the UN recommendations for personal data include that personal data must be

1. Collected and processed fairly and lawfully
2. Kept up to date by the administrator.
3. Utilized in a way known to the person. It must not be disclosed to third parties and must not be kept longer than required by its initial purpose without the persons concent.

7. Advantages of high-level language over low level language

- high level language use structures similar to natural language, this make it easier to learn
- with high level languages you do not need to know the internal circuitry of the computer to be able to write programs as in low level languages
- High level languages make it possible to create multi platform system.

8.Main components of computer systems ar

1. Input
2. Processor
3. Output
4. Storage

9. (a) Total value of RED dresses sold in the three days = G6 * F6

(b) The number o dresses (all colons) sold on Tuesday (Tue)
= Sum (D5:D9) Note (Replace Monday by Tuesday)

10.Modem is an acronym for modulation /demodulation.
Its function is to change analogue signals to digital signals and vice versa. .Modema are commonly used to connect computers over telephone lines

11. Four means of text transmission are

- Telex
- Facsimile
- Video text
- E-mail

12.Convert the binary number 101110011111
(a0 Octal 101/110/011/111
5 6 3 7
$\therefore 101110011111_2 = 5637_8$

(b) Hexadecimal 1011/1001/1111
B 9 F
$\therefore 101110011111_2 = B9F_{16}$

Section D (40 marks)

13 (a) (i) BASIC – Beginners All purpose Symbolic Instructions code
(ii) High level language

(b). (i) $^4/_3 \pi * r \wedge 3$
(ii) (-b + SQR (b ^ 2- 4 * a * c) / (2 * a)

(c) 10 REM PROGRAM TO CALULATE AREA OF A CIRCLE
20 LET P = 3.14159
30 INPUT " enter value of Radius" ;R
40 A = P * R ^ 2
50 PRINT "AREA is " ;A
60 END

d) They represent the sequence in which the program is executed.

14(a) (i) A constant is a quantity which does not change within a program and a variable is a quantity which can take different values.

(ii) 21304 is a numeric constant and is treated as a number "21304" is a numeric sting and is treated as a word.

(b) $C = (F - 32) * {}^5/_9$

(c) Output:
ADD 2 AND 2
4

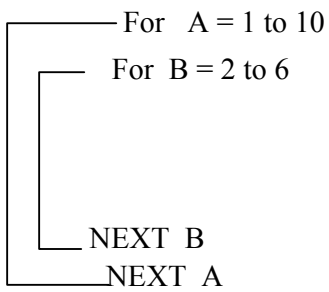
(d) 10 REM MY NAME PROGRAM
20 INPUT " Enter your Name": F$
30 PRINT "MY NAME IS"
40 PRINT F$

15(a) (i) GO TO
(ii) The word BANANAS will be printed endlessly

(b) 10
9
8
7
6
5
4
3
2
1
LIFT OFF!!!!

(c) 20 IF T = 9 THEN GO TO 50
50

(d) This is Invalid Basic Program. Its loops are crossing each other- The second loop must be completely nested in the first if the loops are to function properly.



16. (a)(i) Any array is a list of data items.
(ii) DIM Z(15)

(b) The program segment inputs a name X$ and checks through the entire array N$(i) and it the entered name X$ is equal to any name in the array then the name of that child with its corresponding age is printed.

(c) DIM P(10)
FOR i = 1 to 20 step 2
P (i) = i
NEXT i

17. (a) (i) READ statement tells the computer to go to Data statement take data and assign them to the given variables.

(ii) Restore statement transfers the pointer to the first position in (of) Data (block) and re-read the data items using different variable names.

(b) Input "enter number less than 64"; n
Process = n

```
5       x  = x +1
        bits(x)  = process MOD 2
        process  =  process- bits (x)/ 2
        if process < 2  then 10 else  go to 5

10      x  = x + 1
        bits(x)  = process
        for  i  = 5  to 1 step –1
        print  bits (x)
        next i
```

18. (a) (i) A routine is a sub- program doing a particular task. It helps in subdividing a large program into manageable parts.

(b) – Library functions (built – in functions). These are ready made function
- User defined functions (functions created by the user)

(c) (i) There is no input statement
(ii) Statement of displaying C is Missing

(d) GOSUB