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THE WOODHOUSE HIGH SCHOOL

SUMMER TERM EXAMINATIONS 1984

126/150

COMPUTER STUDIES
PAPER I

Time allowed: 1¼ hours

4A/B

Answer ALL of the questions in the space provided as fully as possible.

1. Explain the difference between a digital and an analogue computer.

A digital computer is a computer which deals with information in a discrete form. There are only two states, on and off. An analogue computer handles information in a continuously variable form. For a digital computer to use analogue input you must use an analogue to digital converter. 4

2. Explain the purpose of a parity check.

A parity check is used in media, eg paper tape, magnetic tape etc to check that the information is correct on the media. With an even parity check, all the 1's (ons) bits must add up to an even number. With an odd one they must add up to an odd number 4

3. Give two advantages of using punched cards for input.

Punched cards are cheap. 2

One card can be changed if there is an error, you dont change all of them

4. Explain the difference between serial and random access.

An example of serial access is on magnetic tape, for example if you want to find file 20, you can to go through files 0-19 first, whereas with random access the read/write head can go straight to file 20 as in the case of a disc. Here, with random access the access time is shorter. 4

14

Continued.....

5. Explain the difference between a moving head and a fixed head disk drive.

. A moving head disc drive has one head for all the tracks,
. and it moves to the track with the required information on.
. A fixed head disc drive has a head for each track and is therefore
. is much faster and access time is reduced. ✓ 4

6. Outline THREE advantages of using microfilm for output.

. Microfilm is small.
. It is relatively cheap. ✓ 3
It is quite long lasting and provides a hard copy.

7. Name THREE types of printer.

. Dot-matrix printer
. Ink-jet printer ✓ 3
. Daisy-wheel printer

8. Explain the difference between MICR and OCR.

. MICR is Magnetic INK Character Recognition - it reads characters
. printed in magnetic ink containing iron particles. This is used on
. the bottom of cheques ✓
. OCR is optical character recognition - using light reflected from
. the paper this can identify characters printed in normal ink, but
. it must be high definition, high quality print. ✓ 4

9. Explain the difference between mark sensing and mark reading.

. Mark sensing - marks must be written in HB pencil. The pencil
. marks conduct electricity and are sensed by two fine wires - used
. for marking multiple choice exam papers. ✓ ✓ 4
. Mark reading uses reflected light to detect the presence of marks made in ink.

10. Explain the purpose of a control unit.

. The control unit is used to fetch information from the
. main memory, decode it and execute it. This is called 3
. the fetch-execute cycle. It also controls the operation
. of the arithmetic logic unit. It also makes sure the program
. runs in the correct order using the program counter. This is
called operation and address

(21)

11. Name TWO functions of the arithmetic logic unit.

. 1) The ALU performs arithmetic functions (+ − × ÷)
. 2) and also logic functions (AND, OR, NOT, NAND, NOR, etc) ✓2

12. Explain the term immediate access store.

. The IAS is part of the main memory used to store
. information as binary numbers. These can be accessed
. immediately, hence the name. ✓2

13. Give TWO advantages of using floppy disks as opposed to cassettes for program storage.

. They have random access, cassettes have serial access
. They are much faster than cassettes 1

14. Explain the term resolution.

. The term resolution is used in graphics. It refers to the
. number of pixels (picture elements) one can fit on the
. screen, the higher the number, the higher the resolution ✓2

15. What is a microfiche? ✓2

. Microfiche is like microfilm, and works on the same principal,
. it is just a different shape (film is on a reel, fiche is a sheet)

16. Change to denary (Base 10)

a) 1101.11_2 (Base 2)

. 8 4 2 1 ½ ¼
. 1 1 0 1 · 1 1 = $13\frac{3}{4}_{10}$ ✓2

11

Question 16 continued.....

Question 16 continued.....

b) 35.4_8 (Octal)

8 1 . $\frac{1}{8}$

$35.4 = 29.\frac{1}{2}_{10}$ ✓2

c) 136_{16} (Hexadecimal)

16× 16 / 96 / 180

256 16 1

1 3 6 = 256+48+6

= 256+54 ✓2

$= 310_{10}$

17. What is a modem used for?

A modem is used to transmit computer data over telephone lines, eg prestel ✓1

18. Explain the difference between a bit, a byte and a word.

A bit is the smallest part of a computers memory, it can represent 1 (on) or 0 (off) ✓ ✓4

Several bits go together to make a byte - the usual is an 8-bit byte

A word is the same as a byte - word and bytes can represent whole number (i.e. eg 01101010_2) 4bits (half a byte is known as a "nibble")

19. Show how to store $+14.0_{10}$ in:

a) fixed binary pt. form.

16 8 4 2 1

14_{10} = 0 1 1 1 0 ✓3

$= 01110_2$

12

Question 19 continued.....

Question 19 continued.....

b) Floating binary pt. form.

assumed binary point

Mantissa = 0111.0_2

Exponent = 100_2 in an 8 bit byte 0111 0100

mantissa | exponent

sign bit ?

2

20. Outline TWO advantages of using floating point arithmetic.

- larger numbers can be handled.
- smaller numbers can be handle

2

21. Show how to subtract 101_2 from 1100_2 using a complementation method.

Check 8 4 2 1

12_{10} 1100_2 = 1100

$5-$ 101_2 +2C 101 2C 101 = 011

1100

ignore MSB

+ 011 = 1111 = 7_{10} = 111_2

3

22. Why are ASCII codes used?

- ASCII codes are used because only numbers (binary) can be stored in the computers memory so each character has to be associated with a number

2

e.g A ASCII code = 65

B " " " = 66

23. Outline the work of Joseph Jacquard. Joseph Jacquard invented logarithm tables to help multiplication and division, and also invented Jacquards loom, a mechanical calculating machine

1

10

Continued.....

24. Who developed the analytical engine?

. Charles Babbage 1

25. Discuss some of thework of Herman Hollerith.

. Herman Hollerith invented the 80-column punched card
. and also the tabulating machine used to process census data
. in the USA at the turn of the century. It had an input
. via punched cards. He invented the punched card & sorter 3
. as well.
.

26. Explain the term "Computer generations".

. The first computers to are called first generation
. computers, they use vacuum tube, as advances were made, they
. called them a different generation, the second, these used diodes
. and transistors. As further advances still were made 4
. these became the third generation, and used LSI (large scale
. integration) we are in the last third generation at the moment with
the invention of the microchip.

27. Explain the difference between RAM and ROM.

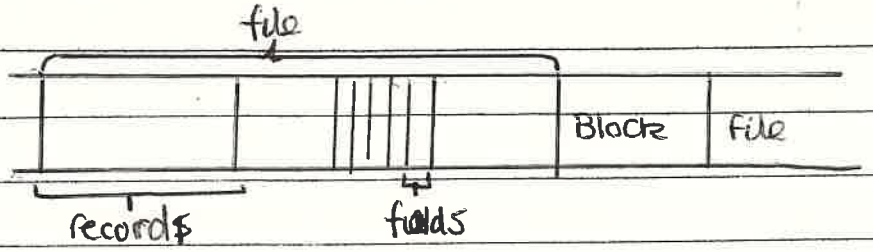
. RAM is Random Access memory and is used to store the programs
. it can be added to and taken from (read). ROM is read only 4
. memory and can only be read. It contains the basic interpreter
. and operating system. In RAM all the contents are lost when
power is switched off (it is volatile) In ROM they are not (non-volatile)

28. Discuss THREE features of microchips.

. Microchips are small and
. They contain many circuits (thousands) many 3
. They use little electricity and are made of silicon or Gallium
. arsenide
.
. 15

Continued.....

29. Explain with he aid of a sketch the difference between a block, record and a field in relation to magnetic tape.



3

. A block is a gap between files ✗ A file is a set of related information eg people with bank accounts ✓
. files are made up of records contain one persons information for example
. This is split into fields contain one piece of information, eg Name.

30. Give TWO advantages of using computers in the police force.

. It is quicker than using paper (for files etc)
. They can help match fingerprints etc. ✓ 2

31. Name TWO files you would expect a pharmacist to keep.

. Drugs in stock and their recommended dosage
. Customers and whatt drugs they take. ✓ 2

32. Explain the term data capture.

. Before data can be processed it has to be collected, this is
. what data capture is, manual data collection, eg filling
. in forms ✓ 2

33. Show how to apply a check digit to this number:

1 0 1 3 2 [?]

. 1+0+1+3+2=7
. check digit. ✓ 2
. New number 101327.
.
.

4

34. Explain the difference between high level and low level languages.

High level language	Low level language
Human readable/easy to learn	Not human readable / hard to learn
Slow	fast
memory inefficient	memory efficient
has to be translated/compiled	does not have to be translated/

15

35. What is a source code?

. A program - usually in a high level language, eg BASIC, with
. you want to translate into another language (usually low level) ✓2

36. What is an object code?

. Source code is translated into object code - It is usually
. a low level language e.g Sir ✓2

37. What is a compiler used for?

. It is used to ~~compile~~ translate a High level language (source code)
. into ~~or~~ machine code (object code) ✓2

38. What program code would you use to generate a random number in the range 1 to 6?

. 10 A = ~~RND(1*6)+1~~ INT (RND(1X6))
. 20 ?A. 1

39. Why are trace routines useful?

. If a program doesn't work, but doesn't give an error
. message a trace routine I can help you find the fault. 1

40. Outline THREE considerations when choosing variable names.

. Whether is it is for a String, real or numerical variable ✓
. Whether you are going to remember it. ✓3
. Whether you have used it before in the program

41. Give an example of a syntax error.

. This could be caused by ~~a~~ mis use of a statment, eg in BASIC
. LET A+B+C=D, which should be ✓2
. LET D=A+B+C.

42. What is a logical error?

. An error which is not a grammatical or syntax error ✓2
. by caused by a fault in the logic of a progam e.g GOTO
. a wrong line number after a choice on ~~a menu~~ a menu 15

Continued.....

43. Explain the term overflow.

An overflow occurs when a number is too big to fit into the space provided for it (or a negative number too small)
e.g 69248 will not fit into an 8 bit byte
so an overflow will occur ✓ 3

44. List THREE reasons why programs need documenting.

So people who know nothing about computers can use a program ✓
So other people can understand how it works ✓ 2
So people know how to work a program ie what buttons to press etc. ~~ect~~ etc.

45. On the lined paper provided write a few notes on ONE of the following:

a) Home micros.
b) Robotics.
c) Computers and space exploration.
d) CAL packages
e) Micro-electronics

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Home micros

In Britain we have have more home-micros per head of population than any other country in the world. The average home micro costs under £500, some costing as little as £39 (a ZX81). Most use BASIC as their programing language but some do run other languages, such as the Jupiter Ace, which uses Forth, but has no colour or sound. As most people use their home-micros for games, colour and sound, and high resolution graphics are essential. There are not only game, but also Utility and second language software. Software is usually on cassette. How long this will take to load depends on the complexity of the program, and the BAUD rate (data transfer rate) of the computer. All home micros are quite small and will easily fit onto a table top. They use colour or b/w television as output, but some can use RGB and monochrome monitors as well. The average home micro will have about 32K of RAM, and a keyboard. How much ROM you have depends on the BASIC used, and also whether you have colour and sound or not.

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