



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

COMPUTER SCIENCE
PAPER 1

6023/1

NOVEMBER 2020 SESSION

3 hours

Additional materials:
Answer paper

Calculators must not be used

TIME 3 hours

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

Answer **all** questions.

Write your answers on the separate answer paper provided.

If you use more than one sheet of paper, fasten the sheets together.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

You are reminded of the need for good English and clear presentation in your answers.

This question paper consists of 4 printed pages.

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[Turn over]

- 1 (a) Distinguish between *overflow* and *underflow*. [2]
- (b) Explain how accuracy can be improved in a floating point representation and state an effect it has on the number represented. [2]
- 2 (a) Express the denary value 208 as a
- (i) binary number using an 8-bits, [1]
- (ii) hexadecimal number, [2]
- (iii) number in BCD. [2]
- (b) Show as 8 bit number in two's complement
- (i) +98, [2]
- (ii) -119. [2]
- (c) Find the product of the binary numbers 101010 and 110000. [2]
- 3 (a) State any **three** properties of a variable. [3]
- (b) Sort the following list using the quick sort algorithm.
- 54 26 93 17 77 31 44 55 20 [6]
- (c) Distinguish between *binary search* and *linear search*. [2]
- (d) Give **one** example and **one** advantage of the following data structures
- (i) static,
- (ii) dynamic. [4]
- 4 The next instruction to be carried out is LAD#35 which loads the number 35 into the accumulator.
- With reference to the registers in a processor, use a diagram, to illustrate the stages of the fetch-execute cycle when dealing with this instruction. [10]

- 5 A system is monitored using sensors. The sensors output binary values corresponding to physical conditions as shown in the table.

parameter	description of parameter	binary value	
P	oil pressure	1	pressure $\geq$ 3 bar
		0	pressure $<$ 3 bar
T	temperature	1	temperature $\geq$ 200°C
		0	temperature $<$ 200°C
R	rotation	1	rotation $\leq$ 1 000 Revs Per Min (rpm)
		0	rotation $>$ 1 000 Revs Per Min (rpm)

The outputs of the sensors form the outputs to a logic circuit. The output from the circuit X is 1, if the following three conditions occur:

Either oil pressure $\geq$ 3 bar and temperature $\geq$ 200°C
 Or oil pressure $<$ 3 bar and rotation $>$ 1 000 rpm
 Or temperature $\geq$ 200°C and rotation $>$ 1 000 rpm

- (a) Draw a logic circuit to represent the above system. [6]
 (b) Complete the truth table below for the system.

P	T	R		x
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

- 6 (a) Define the term *protocol*, giving an example. [2]

- (b) (i) Convert the following IP address to binary.

94 98 155 16

[4]

- (ii) State the type of network the IP address in (i) is suitable for. [1]

- (iii) Name the **two** parts which make up the IP address. [2]

- 7 A school purchases computers and decides that the head's office, the matron's office and Accounts office, each have a computer. The rest of the computers are to be put in the computer laboratory.

The computers are to be connected through a network.

- (a) Name the **three** types of cabling that may be considered and explain the use of each. [6]
 - (b) Outline any **three** factors other than cost that they need to consider when choosing suitable cable. [3]
 - (c) Compare *wireless* and *physical network* connections. [2]
- 8 (a) Each league has a number of teams, each team is in only one league, each team plays in a number of grounds during the season and each ground will host a number of teams during the season.
- Draw an entity relationship diagram to illustrate this scenario. [5]
- (b) Outline any **five** principal duties of a database administrator in a company. [5]
- 9 (a) Explain any **one** difference between *hacking* and *cracking*. [1]
- (b) Security of data is an important concern for a system administrator.
- Describe any **one** feature of a policy for ensuring data security. [2]
- (c) (i) Define the term *social media*. [1]
 - (ii) Outline any **three** benefits and any **three** side effects of social media in society. [6]
- 10 (a) An organisation intends to protect its innovation against competitors on how to manufacture, use and distribute the innovation.
- Describe any **two** measures that the organisation can undertake to protect the innovation against its competitors. [4]
- (b) A High School has decided to introduce e-learning facilities for the benefit of learners at the school.
 - (i) Explain the term *e-learning*. [2]
 - (ii) Describe any **one** benefit and any **one** side effect of e-learning facilities to the learners. [4]