

CHINIOT ISLAMIA PUBLIC SCHOOL AND COLLEGE

1ST QUARTERLY TEST

Computer Science (2210) - Paper 2 - Grade O-II

Name: _____ Section: _____ Roll No: _____

Duration: 2 Units

Total Marks: 50

General Instructions: Answer all questions. Use a black or dark blue pen. Write your name, centre number and candidate number in the boxes at the top of the page.

Total Marks: 50 Name: _____ Section: _____

INSTRUCTIONS • Answer all questions. • Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs. • Write your name, centre number and candidate number in the boxes at the top of the page. • Write your answer to each question in the space provided. • Do not use an erasable pen or correction fluid. • Do not write on any bar codes. • Calculators must not be used in this paper.

INFORMATION • The total mark for this paper is 50. • The number of marks for each question or part question is shown in brackets []. • No marks will be awarded for using brand names of software packages or hardware.

Q1 .

1.

A model shop wants to set up a database to help with stock control of the model figures available for sale. The shop wants to store this information about the model figures:

Field 1 – catalogue number, for example MD1234

Field 2 – description, for example 'small white dog'

Field 3 – number in stock, for example 5

Field 4 – the price of each model, for example 7.40

Field 5 – if the model has already been painted, yes or no.

(a) The shop needs **five** fields for each record.

Give a suitable name and data type for each field.

Field 1 name

Data type

Field 2 name

Data type

Field 3 name

Data type

Field 4 name

Data type

Field 5 name

Data type

[5]

(b) (i) Give the name of the field that should be used for the primary key.

..... [1]

2.

A television subscription service has a new database table named `Contract` to store details of their subscribers' contracts. The table contains these fields:

- `ContractNumber` – the contract number, for example CT567
- `Months` – the length of the contract in months, for example 6
- `EndDate` – the date the contract finishes, for example 30 November 2024
- `News` – the news service, yes or no
- `Movie` – the movie service, yes or no
- `Sport` – the sports service, yes or no
- `Junior` – the children's service, yes or no.

(a) Identify the field that will be the most appropriate primary key for this table.

..... [1]

(b) Complete the table to identify the most appropriate data type for these fields in `Contract`

Field	Data type
<code>ContractNumber</code>	
<code>Months</code>	
<code>EndDate</code>	
<code>Sport</code>	

[2]

(c) Explain the purpose of these structured query language (SQL) statements.

Statement 1: `SELECT SUM (Months) FROM Contract;`

Statement 2: `SELECT COUNT (News) FROM Contract WHERE News;`

Statement 1

.....

.....

Statement 2

.....

.....

[3]

3.

A database table called `Hangar1` stores details of a collection of historic aircraft at a museum.

ID	Make	Model	Year	Engines	Airworthy
JM1	Hawker Siddeley	Nimrod	1966	4	Y
JM2	Douglas	DC-10	1970	3	Y
JM3	Aérospatiale-BAC	Concorde	1973	4	N
PB1	De Havilland	DH-9	1918	1	Y
PB2	Hawker	Fury	1935	1	Y
PB3	Hawker	Nimrod	1934	1	Y
PM1	Fieseler	Storch	1942	1	N
PM2	Hawker	Hurricane	1942	1	Y
PM3	Supermarine	Spitfire	1942	1	N
PM4	Douglas	C-47 Dakota	1942	2	N
PS1	Boeing	314 Clipper	1936	4	N

- (a) State the number of fields and records in the database table.

Fields

Records

[2]

- (b) Give the output that would be produced by the structured query language (SQL) statement:

```
SELECT Model, Year, Engines
FROM Hangar1
WHERE Engines > 1
ORDER BY Year;
```

[illegible]

[4]

4.

A music streaming service has a new database table named *Songs* to store details of songs available for streaming. The table contains the fields:

- *SongNumber* – the catalogue number, for example AG123
- *Title* – the title of the song
- *Author* – the name of the song writer(s)
- *Singer* – the name of the singer(s)
- *Genre* – the type of music, for example rock
- *Minutes* – the length of the song in minutes, for example 3.75
- *Recorded* – the date the song was recorded.

(a) Identify the field that will be the most appropriate primary key for this table.

..... [1]

(b) Complete the table to identify the most appropriate data type for the fields in *Songs*

Field	Data type
<i>SongNumber</i>	
<i>Title</i>	
<i>Recorded</i>	
<i>Minutes</i>	

[2]

(c) Explain the purpose of the structured query language (SQL) statements.

`SUM (Minutes) FROM Songs WHERE Genre = "rock";`

`COUNT (Title) FROM Songs WHERE Genre = "rock";`

.....

 [3]

Q2 .

1.

Four logic functions and **five** standard symbols for logic gates are shown.

Draw **one** line to link each logic function to its standard symbol. **Not** all standard symbols will be used.

Logic function	Standard symbol
AND	
XOR	
NAND	
OR	
	

[4]

2.

A car's engine management system uses three sensors A, B and C. The data from these sensors forms the input to a logic circuit. When the output (X) from the logic circuit is 1 a signal is sent to a warning light on the dash board of the car. The following table describes the conditions being monitored.

Parameter description	Parameter	Binary value	Description of condition
exhaust temperature	E	0	exhaust temperature > 400°C
		1	exhaust temperature ≤ 400°C
oil pressure	P	0	oil pressure ≤ 10 bar
		1	oil pressure > 10 bar
water temperature	W	0	water temperature ≤ 110°C
		1	water temperature > 110°C

Output, X, will generate a value of 1, if:

either exhaust temperature > 400°C AND oil pressure > 10 bar
 or oil pressure ≤ 10 bar AND water temperature > 110 °C
 or oil pressure > 10 bar AND water temperature > 110 °C

Produce:

- i a truth table,
- ii a logic expression and
- iii a logic circuit

3.

A motor driving a water pump has a safety system which uses three inputs to a logic circuit. A certain combination of conditions results in an output, X , from the logic circuit being equal to 1. When the value of $X = 1$ then the motor and pump are shut down. The following table shows which parameters are being monitored and form the three inputs to the logic circuit.

Parameter description	Parameter	Binary value	Description of condition
motor speed	S	0	motor speed ≤ 2000 rpm
		1	motor speed > 2000 rpm
bearing temperature	T	0	bearing temperature $\leq 90^{\circ}\text{C}$
		1	bearing temperature $> 90^{\circ}\text{C}$
water velocity	V	0	water velocity ≤ 5 m/s
		1	wind velocity > 5 m/s

The output, X , will have a value of 1 if any of the following combination of conditions occur:

- » **either** motor speed > 2000 rpm and bearing temperature $> 90^{\circ}\text{C}$
- » **or** motor speed ≤ 2000 rpm and water velocity ≤ 5 m/s
- » **or** bearing temperature $> 90^{\circ}\text{C}$ and water velocity ≤ 5 m/s
- a** Design a logic circuit for the above scenario.
- b** Complete a truth table for the above scenario.

4.

There are **three** descriptions of logic gates. Each logic gate has two inputs **A** and **B** with one output **X**. Identify each logic gate. Complete a truth table for each logic gate.

- (a) The only time the output is 1 is when both inputs are 1.

Logic gate

Complete the truth table for this description.

A	B	X
0	0	
0	1	
1	0	
1	1	

[2]

- (b) The output is 1 when both inputs are different.

Logic gate

Complete the truth table for this description.

A	B	X
0	0	
0	1	
1	0	
1	1	

[2]

5.

Produce the logic circuit and complete a truth table to represent the following scenario.

A power station has a safety system controlled by a logic circuit. Three inputs to the logic circuit determine whether the output, S, is 1. When $S = 1$ the power station shuts down.

The following table describes the conditions being monitored.

Parameter description	Parameter	Binary value	Description of condition
gas temperature	G	0	gas temperature $\leq 160^{\circ}\text{C}$
		1	gas temperature $> 160^{\circ}\text{C}$
reactor pressure	R	0	reactor pressure ≤ 10 bar
		1	reactor pressure > 10 bar
water temperature	W	0	water temperature $\leq 120^{\circ}\text{C}$
		1	water temperature $> 120^{\circ}\text{C}$

Output, S, will generate a value of 1, if:

either gas temperature $> 160^{\circ}\text{C}$ AND water temperature $\leq 120^{\circ}\text{C}$

or gas temperature $\leq 160^{\circ}\text{C}$ AND reactor pressure > 10 bar

or water temperature $> 120^{\circ}\text{C}$ AND reactor pressure > 10 bar

6.

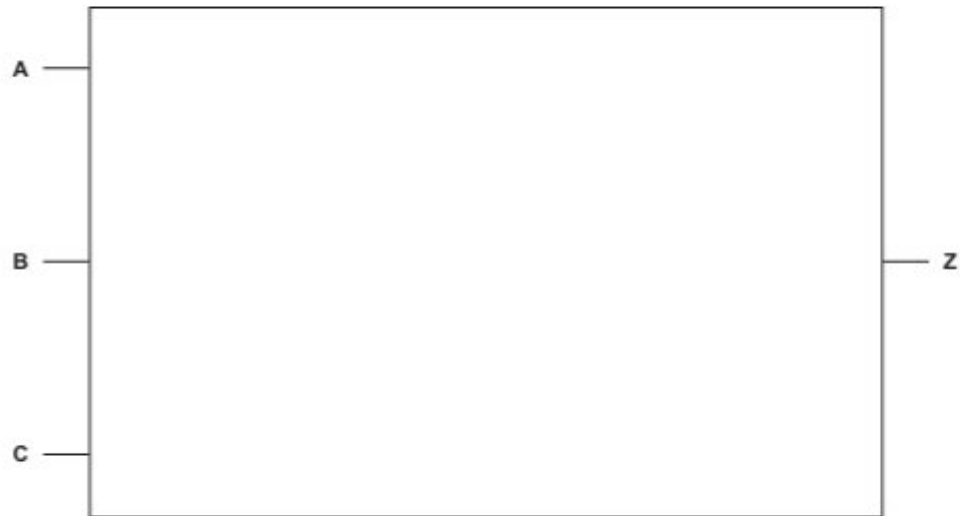
Consider the logic expression:

$$Z = (A \text{ NAND } B) \text{ OR NOT } (B \text{ XOR } C)$$

(a) Draw a logic circuit for this logic expression.

Each logic gate must have a maximum of **two** inputs.

Do **not** simplify this logic expression.



[4]

(b) Complete the truth table from the given logic expression.

A	B	C	Working space	Z
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]

7. A wind turbine has a safety system which uses three inputs to a logic circuit. A certain combination of conditions results in an output, X, from the logic circuit being equal to 1. When the value of X = 1 then the wind turbine is shut down.

The following table shows which parameters are being monitored and form the three inputs to the logic circuit.

▼ Table 10.20

parameter description	parameter	binary value	description of condition
turbine speed	S	0	turbine speed $\leq$ 1000 rpm
		1	turbine speed $>$ 1000 rpm
bearing temperature	T	0	bearing temperature $\leq$ 80°C
		1	bearing temperature $>$ 80°C
wind velocity	W	0	wind velocity $\leq$ 120 kph
		1	wind velocity $>$ 120 kph

The output, X, will have a value of 1 if any of the following combination of conditions occur:

- Either** turbine speed $\leq$ 1000 rpm and bearing temperature $>$ 80°C
- Or** turbine speed $>$ 1000 rpm and wind velocity $>$ 120 kph
- Or** bearing temperature $\leq$ 80°C and wind velocity $>$ 120 kph

Design the logic circuit and complete the truth table to produce a value of X = 1 when either of the three conditions above occur.

8. Consider this logic expression:

$$Z = (A \text{ NAND } B) \text{ XOR } (\text{NOT } (\text{NOT } B \text{ NAND } C))$$

(a) Draw a logic circuit for this logic expression.

Each logic gate must have a maximum of **two** inputs.

Do **not** simplify the logic expression.



(b) Complete the truth table from the given logic expression.

A	B	C	Working space	Z
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Q3 .

1.

A program needs to make sure the characters input for a product code meet these rules:

- The product code is six characters in length.
- The first two characters must be "PD".
- The last four characters must be a number in the range 1000 to 9999 inclusive.

(a) Identify **three** validation checks and state how each check would make sure the product code met one of these rules.

Check 1

.....

Check 2

.....

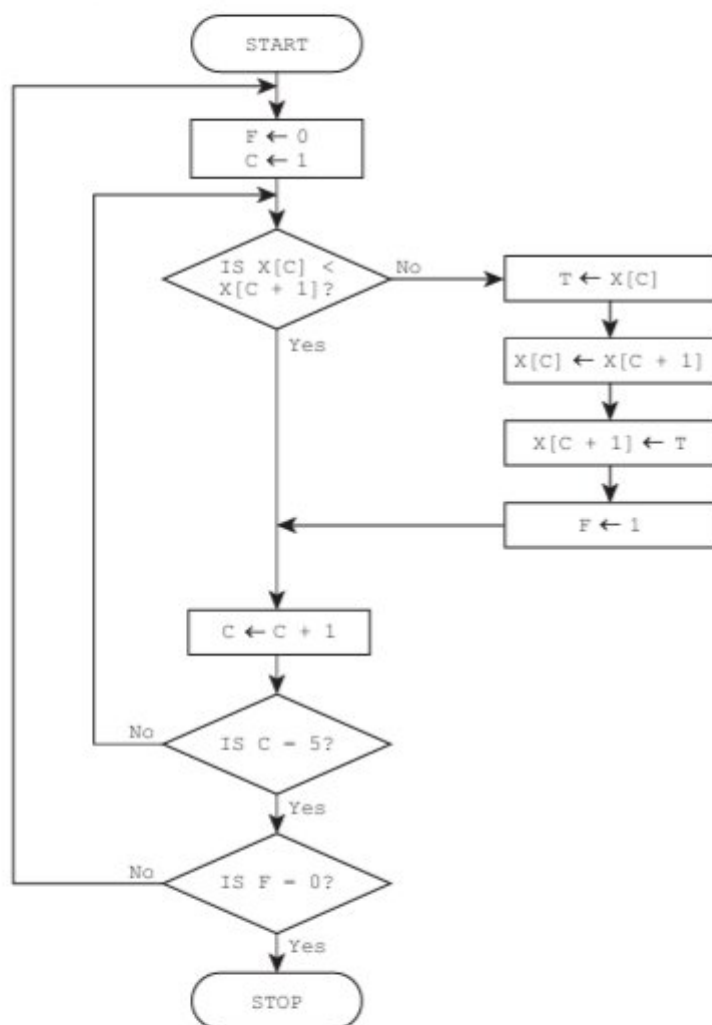
Check 3

.....

[6]

2.

This flowchart represents an algorithm.



(a) The array $x[1:5]$ used in the flowchart contains this data:

$x[1]$	$x[2]$	$x[3]$	$x[4]$	$x[5]$
10	1	5	7	11

Complete the trace table by using the data given in the array.

F	C	x[1]	x[2]	x[3]	x[4]	x[5]	T
		10	1	5	7	11	

[5]

(b) Describe the purpose of the algorithm.

.....

.....

.....

..... [2]

3.

An algorithm has been written in pseudocode to allow some numbers to be input. All the positive numbers that are input are totalled and this total is output at the end.

An input of 0 stops the algorithm.

```

01 Exit ← 1
02 WHILE Exit <> 0 DO
03     INPUT Number
04     IF Number < 0
05         THEN
06             Total ← Total + Number
07         ELSE
08             IF Number = 0
09                 THEN
10                     Exit ← 1
11             ENDIF
12         ENDIF
13 ENDIF
14 OUTPUT "The total value of your numbers is ", Number

```

(a) Identify the **four** errors in the pseudocode and suggest a correction for each error.

Error 1

Correction

Error 2

Correction

Error 3

Correction

Error 4

Correction

4.

Tick (✓) **one** box to complete this sentence.

A solution to a problem may be represented using pseudocode, flowcharts or

A procedures.

☐

B processes.

☐

C structure diagrams.

☐

D sub-systems.

☐

[1]

Tick (✓) **one** box to complete this sentence.

A pseudocode example of a selection statement is

A CALL Sorting(Value1, Value2)

☐

B DECLARE Count : INTEGER

☐

C IF X = 7 THEN Y ← 21 ENDIF

☐

D WHILE X <> -1 DO

☐

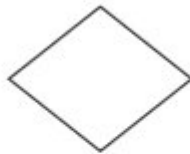
[1]

Four flowchart symbols and five purposes are shown.

(a) Draw **one** line to link each flowchart symbol to its correct purpose.

Not all purposes will be used.

Flowchart symbol



Purpose

subroutine

process

flow

decision

terminator

[4]

5.

A high-level programming language makes use of arithmetic, Boolean and logical operators.

State how each type of operator is used.

Give an example statement, in pseudocode, for each one.

Arithmetic

.....

Example

.....

Boolean

.....

Example

.....

Logical

.....

Example

.....

[6]

6.

Tick (✓) **one** box to show which check is used for verification when data is input.

- A length check ☐
- B range check ☐
- C type check ☐
- D visual check ☐

[1]

Tick (✓) **one** box to identify which option is used to show the inputs and output of a Boolean expression.

- A flowchart ☐
- B trace table ☐
- C truth table ☐
- D variable ☐

[1]

Four operators and **three** types of operator are shown.

Draw **one or more** lines from each operator to its correct operator type.

Operator

>=

AND

DIV

+

Operator type

Boolean

Arithmetic

Logical

[4]

7.

Complete the paragraph about databases. Use terms from the list. You may need to use a term more than once. Some of the terms in the list will **not** be used.

fields	comments	columns	constant	key
table	primary key	program	records	rows
scripts	database	validation	variable	

Database tables consist of and

Rows are

..... are fields.

Structured query language (SQL) are used to query data.

A uniquely identifies a record.

[6]

8.

One stage of the program development life cycle is the analysis stage.

Identify and describe **two** other stages of the program development life cycle.

Stage

Description

.....

.....

.....

.....

Stage

Description

.....

.....

.....

.....

[6]

9. A programmer is designing a program to check the length of a password and to check if the password input is the same as the stored password.

The program requirements are:

- input the password, `Password`
- check if there are at least 8 characters in the password
- check that the password is **not** the same as the stored password `OldPass`
- output 'accepted' if both tests are completed successfully
- otherwise, output 'rejected'.

Use the variable names given.

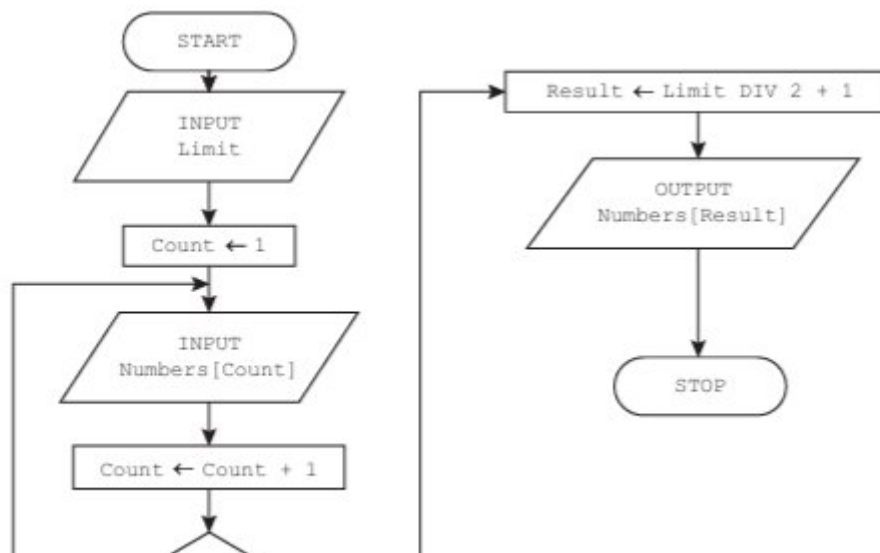
- (a) Complete the flowchart for the program.

START

STOP

[6]

10. 6 The flowchart represents an algorithm.

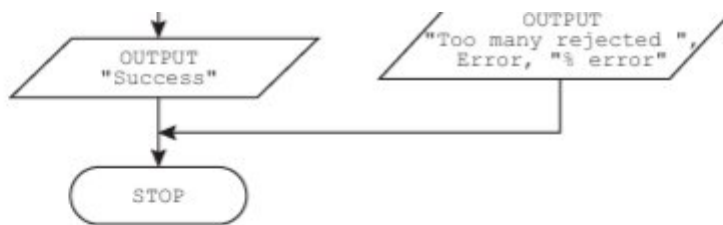


[illegible]

An incomplete algorithm has been written in pseudocode to count the number of zeros stored in an array and total the non-zero values.

12.

This is an algorithm to find if a batch of parts has been manufactured successfully.



Complete the trace table using this data:
 Y, Y, Y, N, Y, Y, Y, Y, N, Y, Y, Y, Y

Accept	Reject	PartOK	Error	OUTPUT

[5]

(b) Describe the purpose of the algorithm.

.....

.....

.....

..... [2]