



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

COMPUTER SCIENCE

6023/2

PAPER 2 Practical

NOVEMBER 2020 SESSION

3 hours

Additional materials:

1 CD for each candidate,
Printing facility,
Bond Paper.

TIME 3 hours

INFORMATION FOR CANDIDATES

This is a purely practical paper. All answers should be printed. Handwritten answers will **not** be marked.

This paper consists of **three** sections.

Section A	20 marks
Section B	50 marks
Section C	30 marks

Answer **one** question from each section.

Each answer sheet should include the following information in the header section:

- Candidate Name and Candidate Number
- Centre Name and Date
- Subject Code

When answering programming questions, indicate the language used.

All work should be backed up by a soft copy on a CD.

If a candidate prints on more than one sheet, fasten together with string.

All answers should be correctly and clearly numbered.

This question paper consists of 8 printed pages.

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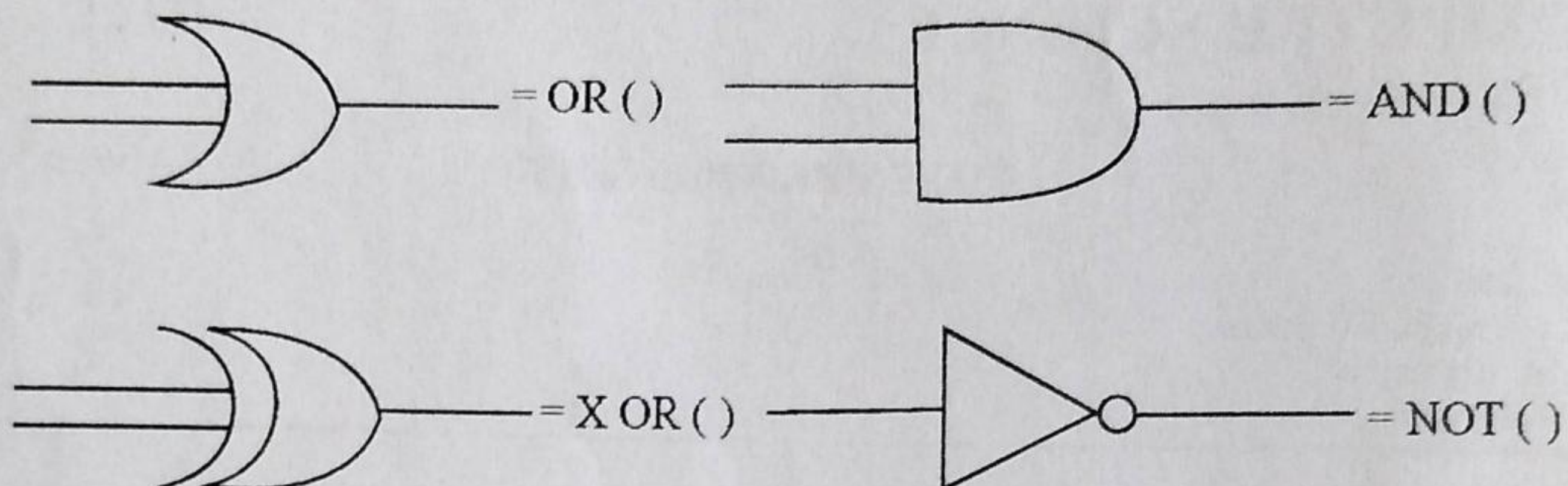
[Turn over

Section A [20 marks]

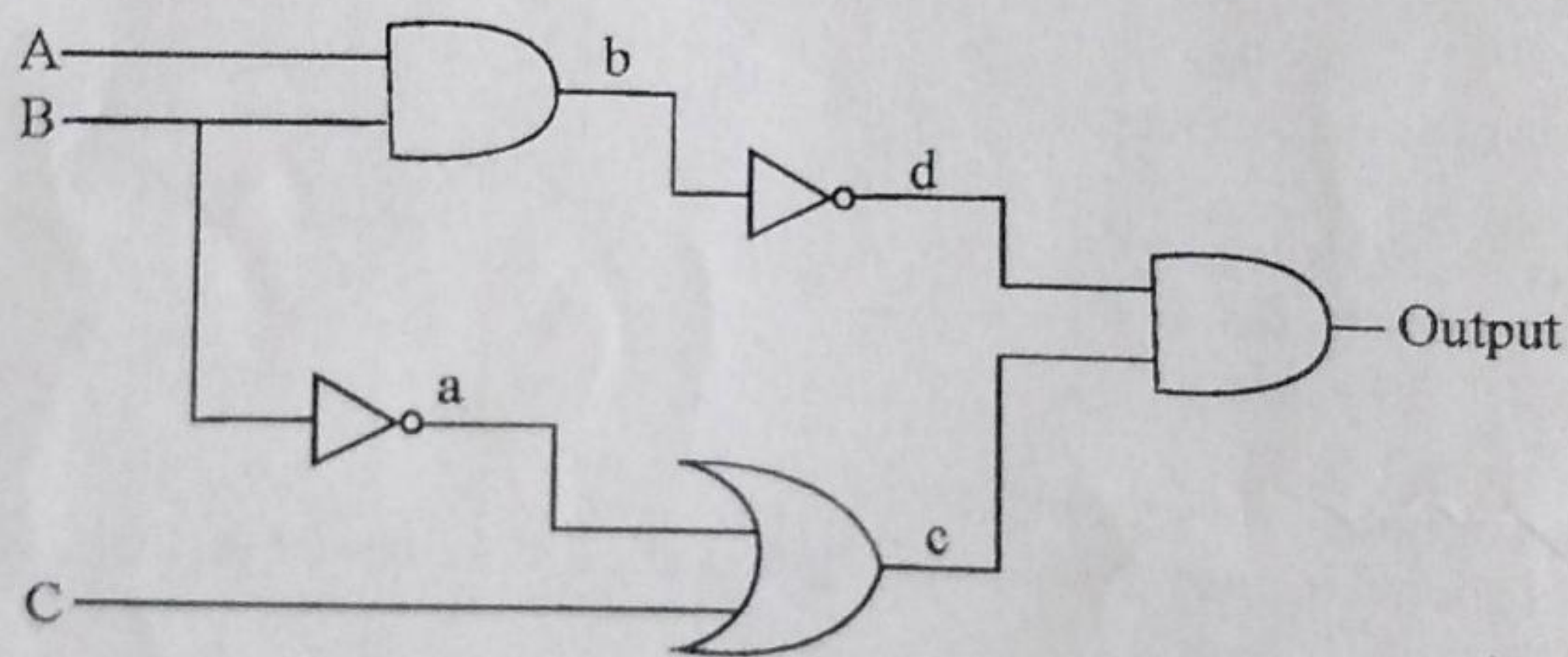
Answer any **one** question from this section.

- 1 Use a spreadsheet of your choice to simulate the following logic of the worksheet.

(a) Use **only** the following formulae:



Simulate the circuit below on the spreadsheet and complete the truth table that follows.



[5]

- (b) Draw the Von Neuman and Harvard architecture explaining their differences.

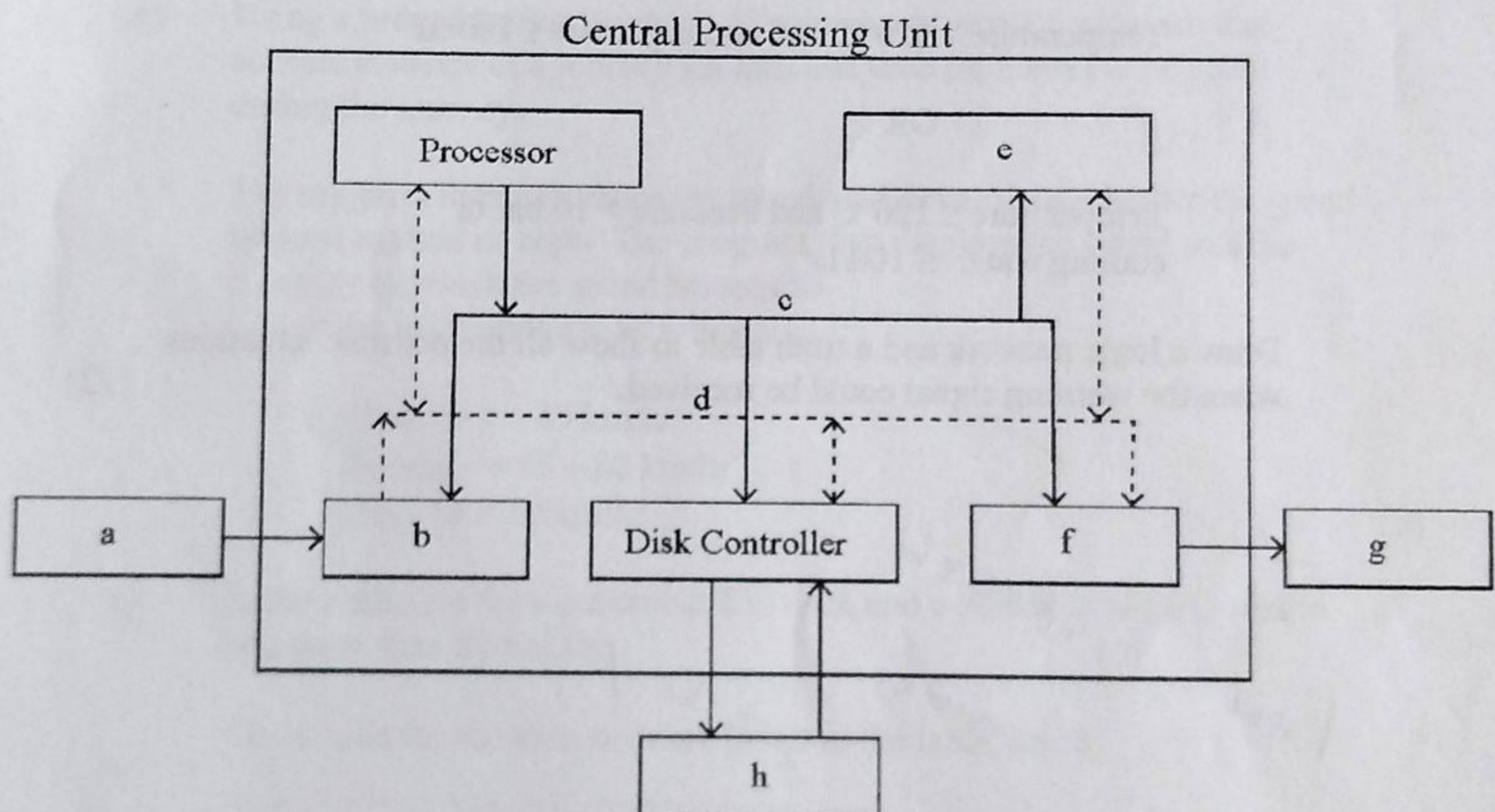
Justify your answer to which architecture is the best to adopt.

[7]

(c) Some of the components of a computer system are:

- | | | |
|--------------|---|---------------------|
| Peripherals | - | Keyboard |
| | - | Monitor |
| 1/0 Ports | - | VDU controller |
| | - | Keyboard Controller |
| Memory | - | Main Memory |
| | - | Secondary Storage |
| System buses | - | Data bus |
| | - | Address bus |

Draw the diagram below and label the components using the list above.



[8]

- 2 (a) A retail store in Mutare wants to buy an accounting application package which will assist in carrying out daily store operations. The operations include taking product stock, capturing sold products and printing reports for managerial staff.

As a system developer, design a suitable software architecture for the mentioned requirements using an appropriate design tool.

[8]

- (b) A power station has a safety system based on **three** inputs to a logic network. A warning signal ($s = 1$) is produced when certain conditions occur based on these three inputs described in the table below.

input	binary value	plant status
T	1	temperature $> 120^{\circ}\text{C}$
	0	temperature $\leq 120^{\circ}\text{C}$
P	1	pressure > 10 bar
	0	pressure ≤ 10 bar
W	1	cooling water $> 100/\text{hr}$
	0	cooling water $\leq 100/\text{hr}$

A warning signal ($s = 1$) will be generated if either:

- Temperature $> 120^{\circ}\text{C}$ and cooling water $\leq 100/\text{hr}$

OR

- Temperature $\leq 120^{\circ}\text{C}$ and Pressure > 10 bar or cooling water $\leq 100/\text{hr}$

Draw a logic network and a truth table to show all the possible situations when the warning signal could be received.

[12]

1 acre = 01404686
2 acres ? more

SZD/T

Section B [50 marks]

Answer any **one** question from this section.

- 3 (a) Write an algorithm in pseudo code to calculate the average of a set of 5 marks for 10 students entered through the keyboard. [8]
- (b) Design an interface and write a program to convert acres to hectares. [1 acre = 0.404686 hectares.]
The program should accept input from the user and display the output. The program should work for real numbers as well as whole numbers (e.g. it should accept 7.2 acres, 0.5 acres etc). [8]
- (c) By using the bubble sort algorithm, write a code to sort an integer array of 10 (ten) elements in ascending order. [25]
- (d) Using a programming language of your choice, write a program that accepts distance of a journey (in km) and time (in hours) to be spent during the journey.

The program then calculates the speed; and determines whether the speed is slow, normal or high. The program then displays the speed and the category in which the speed belongs to.

The speed categories are as follows:

Slow → 1 – 45 km/hr

Normal → 45 – 80 km/hr

High → > 80 km/hr

[9]

- 4 (a) Tickets are sold for a concert at \$30 each and a person is not allowed to buy more than 50 tickets.

The details for the discounts are given in the table below.

number of tickets	discount
10 – 20	10%
21 – 50	20%

Draw a flowchart of a program that accepts the number of tickets, calculates discount and displays the total cost of the tickets. [12]

- (b) A program accepts total amount of daily sales transactions for three salespersons, accumulates the total sales for each salesperson and the grand total of all the sales. The program then outputs salesperson number, total sales per salesperson and the grand total.

(i) Draw a structure diagram to illustrate the program. [13]

(ii) Write a program for the scenario described. [25]

Section C [30 marks]

Answer any **one** question from this section.

- 5 (a) A school has a policy that a learner has to participate in at least one club. Each club has at least one patron who is a teacher. A teacher may only patron one club.

(i) Draw an ER-diagram for this system with clear labels on the relationships amongst the entities in the scenario, in second normal form (2NF). [6]

(ii) Suggest attributes for each entity by drawing on the same diagram or by typing in a separate table from the database model.

State the primary key for each entity. [9]

- (b) A shopkeeper uses a single file to record details of sales of goods. Table 1 shows the record details.

Table 1: Stock Sales.

DATE

Date	St code	description	Qty	each	nett	VAT	slip	till	cashier	invoice
12/04/17	PS001	Pork Sausage Roll	2.00	0.80						
	TP105	Tissue white rose	1.00	2.95						
	PS092	Fruit Scone	6.00	0.50						
	LB6911	Geisha white vitamin E	7.00	0.99						
	CB01	30 Micron Plastic	1.00	0.10						
12/04/17					12.39	2.19	4069	011	546	0015

The shopkeeper also has a separate file where the records of till operators are kept. The records are shown in Table 2.

Table 2: Till operators

Stock defective

op ID	surname	name	cell no:
546	Mukango	Plaxedes	+26375269111
547	Nkomo	Lizwelihle	+26389152346
548	Johns	Melissa	+26375623592
549	Zhuwawo	Panashe	+26375885613

- (i) Using a DBMS of your choice, write SQL statements for the creation of a database table for **Table 1** in INF and for each field specify the following:

- A.) Name (Identifier)
B.) Data type
C.) Field size

Specify the primary key for this relation.

***NB:** No need for data entry into table.

[10]

- (ii) Normalise **Table 1** to second normal form. Type the table listing in a text document.

Save and print all your work.

[5]

- 6 An international restaurant has a buyer who purchases international beverages for their exotic clients. The buyer has recorded details of the products as shown in the table below.

Category	Country	Code	Product	Stock	Special	Price
Coffee	El Salvado	405	Salvado CFTM	264	N	2.75
Tea	India	347	Phuguri Super	27	Y	16
Tea	China	303	Douyun Golden	10	Y	20
Coffee	Australia	473	Ausie Skybury	424	N	3.5
Coffee	Haiti	416	Voodoo CTM	62	Y	8.75
Tea	Sumatra	438	Jumpa Jaya	408	N	3.5
Coffee	Guatemala	470	Blue Pearl	473	N	4.5
Tea	Peru	484	Treasure Org	178	N	9.5
Coffee	Colombia	409	Inca Gold TM	71	N	2.75
Coffee	Colombia	417	Inca Dark TM	402	Y	12.5
Tea	China	330	Strawberry	128	N	4.4
Tea	China	138	Jasmine Yin H	352	Y	10.82
Tea	Zimbabwe	501	Tanganda	12	N	3.5

- (a) As a systems analyst for a small software company called Soft-IT you want to develop a database for the restaurant to incorporate into their system.

- (i) Code SQL statements to create the database called HOTBEV and create a table called PRODUCTS which will best store the data shown in the table.

The code should be able to

- Specify data types
- Specify field size
- Specify the primary key

[10]

(ii) Code an SQL Statement that displays the data below.

A

code	stock	price
138	352	10.82
303	10	20
330	128	4.4

[5]

B

category	country	value of products
Tea	India	432
Tea	China	200
Tea	China	3 808.64
Coffee	Haiti	542.5
Coffee	Colombia	5 025

[8]

(b) The buyer deals with several suppliers to acquire these products. For each country, one supplier is used. The system is expected to store the following details about the supplier:

- Supplier ID
- Name
- Address
- Country Supplied
- Contact Phone
- Email

Draw an ER diagram depicting relationships amongst the supplier, product and country of origin of product in 2NF.

[7]