



Cambridge International AS & A Level

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COMPUTER SCIENCE

9618/32

Paper 3 Advanced Theory

October/November 2025

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

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.
- 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.
- You may use an HB pencil for any diagrams, graphs or rough working.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- 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.

This document has **16** pages. Any blank pages are indicated.

1 The composite data type, *Car*, is defined in pseudocode as:

```
TYPE Car
  DECLARE RegNumber : STRING
  DECLARE Make : STRING
  DECLARE Model : STRING
  DECLARE BodyStyle : STRING
  DECLARE Colour : STRING
  DECLARE IntoStock : DATE
  DECLARE Price : REAL
ENDTYPE
```

(a) (i) Write the **pseudocode** statement to set up a variable for one record of the composite data type, *Car*.

.....
 [1]

(ii) Write the **pseudocode** statements to assign the following values to the variable set up in part (a)(i):

- "Blue" to Colour
- 21/10/2025 to IntoStock

.....

 [2]

(b) The data type for *BodyStyle* is changed to an enumerated type, *Body*.

(i) Write the **pseudocode** statement for the type declaration of *Body* to hold the names of the available choices:

Convertible, Hatchback, Saloon, SUV

.....

 [2]

(ii) Write the new **pseudocode** statement required to update the declaration of *BodyStyle* in the definition of *Car*.

.....
 [1]



2 Numbers are stored in a computer system using binary floating-point representation with:

- 10 bits for the mantissa
- 6 bits for the exponent
- two's complement form for both the mantissa and the exponent.

(a) Calculate the denary value of the given normalised binary floating-point number.
Show your working.

Mantissa

Exponent

0	1	1	1	1	0	0	1	0	1
---	---	---	---	---	---	---	---	---	---

0	0	1	0	1	1
---	---	---	---	---	---

Working

.....

.....

.....

.....

Denary value

[3]

(b) Calculate the normalised binary floating-point representation of +26.6875 in this system.
Show your working.

Mantissa

Exponent

--	--	--	--	--	--	--	--	--	--

--	--	--	--	--	--

Working

.....

.....

.....

.....

.....

[3]



- 3 (a) HTTP and IMAP are examples of protocols used in the Application Layer of the TCP/IP protocol suite.

State the purpose of the HTTP and IMAP protocols.

HTTP

.....

IMAP

.....

[2]

- (b) Describe how files are shared using the BitTorrent protocol.

.....

.....

.....

.....

.....

.....

.....

.....

[4]

- 4 (a) Identify **one** benefit of circuit switching **and one** benefit of packet switching.

Circuit switching

.....

Packet switching

.....

[2]

- (b) Identify **two** differences between circuit switching and packet switching.

1

.....

.....

2

.....

.....

[2]



5 (a) Describe how interrupt handling is used in low-level scheduling.

.....

.....

.....

.....

.....

..... [2]

(b) In process management, a process can be in one of three process states: running, ready or blocked.

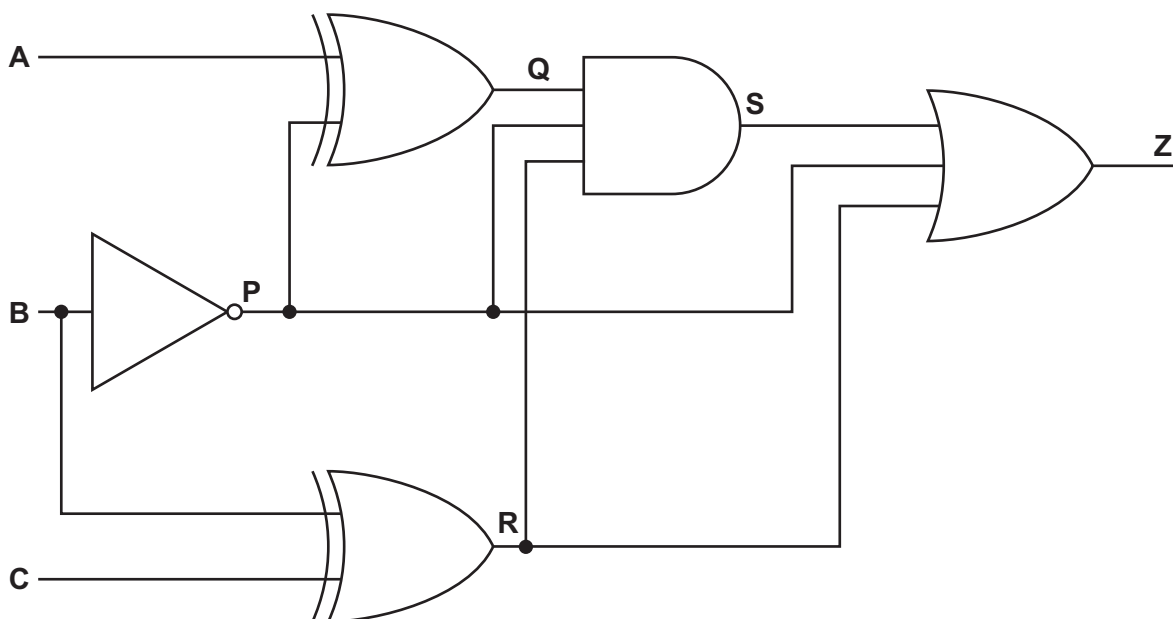
Complete the table to identify **one** reason why a process could be in each of the three states.

Process state	Reason
running	
ready	
blocked	

[3]



6 (a) The diagram shows a logic circuit.



Complete the truth table for the given logic circuit.
Show your working.

			Working space				
A	B	C	P	Q	R	S	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					

[3]



(b) (i) Complete the Karnaugh map (K-map) for the Boolean expression:

$$\bar{A}\bar{B}.C + \bar{A}.B.C + A.\bar{B}.C + A.B.\bar{C}$$

		BC			
		00	01	11	10
A	0				
	1				

[2]

(ii) Draw loop(s) around appropriate group(s) in the K-map to produce an optimal sum-of-products. [2]

(iii) Write the Boolean expression from your answer to part b(ii) as a simplified sum-of-products. Do **not** carry out any further simplification.

..... [2]

7 (a) Asymmetric encryption is a type of cryptography.

Identify **one** other type of cryptography.

..... [1]

(b) An organisation holds two asymmetric encryption keys, which they intend to use to receive secure transmissions.

Explain how the organisation makes use of the two keys to receive a secure transmission.

..... [4]



8 (a) State the purpose of the optimisation stage in the compilation of a program.

.....

.....

.....

..... [1]

(b) Convert this Reverse Polish Notation (RPN) back to its original infix form:

a b - c + c a - * d /

.....

.....

.....

.....

.....

..... [3]

(c) The RPN expression:

c a / b d - * b +

is to be evaluated, where:

a = 3, b = 16, c = 9 and d = 6.

Show the changing contents of the stack as the RPN expression is evaluated.

[4]



9 (a) Deep Learning is a form of Machine Learning.

(i) State **one** example where Deep Learning is used.

.....
..... [1]

(ii) Identify how Deep Learning can be made more effective.

.....
..... [1]

(b) Describe the back propagation of errors method in Machine Learning.

.....
.....
.....
.....
.....
.....
.....
..... [4]

10 An exception is an error that may cause a program to halt unexpectedly.

(a) Describe how program termination due to an exception can be avoided.

.....
.....
.....
.....
..... [2]

(b) Identify **two** possible causes of exceptions.

1
.....
2
..... [2]





- 11 The table shows assembly language instructions for a processor that has one register, the Accumulator (ACC).

Label	Instruction		Explanation
	Opcode	Operand	
	LDM	#n	Load the number n to the ACC
	LDD	<address>	Load the contents of the location at the given address to ACC
	LDI	<address>	The address to be used is at the given address. Load the contents of this second address to the ACC.
	ADD	<address>	Add the contents of the given address to the ACC
	SUB	<address>	Subtract the contents of the given address from the ACC
	STO	<address>	Store the contents of the ACC at the given address
<label>:		<data>	Gives a symbolic address <label> to the memory location with the contents <data>
# denotes a denary number, e.g. #123			
<label> can be used in place of <address>			

The current contents of memory are:

Address	Contents
150	26
300	86
420	150





Write **assembly language** code, using **only** the given instruction set to:

- store the contents of location 300 as labelled variable `A`
- store the contents of location 420 as labelled variable `B`
- add the value stored in the address contained in variable `B` to the value contained in variable `A`
- store the result in variable `Answer`.

Show the initialisation and values of the variables `A`, `B` and `Answer` in the table provided.

.....

.....

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.....

.....

.....

.....

Label	Content

[7]



- 12 (a) A stack has been implemented using pseudocode to store a maximum of 100 string items using the global variables in the following table:

Identifier	Data type	Description	Initialisation value
Base	INTEGER	pointer for the bottom of the stack	0
Top	INTEGER	pointer for the top of the stack	-1
StackArray	STRING	1D array to implement the stack	[0:99]
Max	INTEGER	maximum number of items in the stack	100

The value of `Top` is incremented each time a data item is added to the stack and decremented each time a data item is removed. If the stack is full, an appropriate error message is output.

- (i) Complete the **pseudocode** for the procedure to add a data item onto the stack.

```

PROCEDURE Push (.....)
    IF Top < Max - 1 THEN

        Top ← .....

        ..... ← NewData
    ELSE

        OUTPUT .....
    ENDIF
ENDPROCEDURE

```

[4]

- (ii) Write **pseudocode** to input a new data item and add it to the stack using `Push()`.

```

.....
.....
.....
.....

```

[2]

- (b) Explain the reasons why a stack is used when a recursive algorithm is executed.

```

.....
.....
.....
.....
.....
.....

```

[3]











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