

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE

C500U10-1



S25-C500U10-1



MONDAY, 12 MAY 2025 – AFTERNOON

COMPUTER SCIENCE – Component 1

Understanding Computer Science

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

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 orderly, clear presentation in your answers.

The use of calculators is not permitted in this examination.

The total number of marks is 100.

Some questions will require you to draw on knowledge from multiple areas of your course of study.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	9	
2.	6	
3.	11	
4.	7	
5.	10	
6.	8	
7.	6	
8.	8	
9.	10	
10.	7	
11.	6	
12.	12	
Total	100	

C500U101
01



JUN25C500U10101

Answer **all** questions.

1. A Central Processing Unit (CPU) is the primary hardware component of a computer that performs arithmetic, logical, control and input/output operations.

(a) State the purpose of the components in the Von Neumann CPU architecture:

(i) Control unit (CU)

[1]

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(ii) Program counter (PC)

[1]

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(iii) Accumulator (ACC)

[1]

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- (b) (i) Describe how cache size and clock speed contribute to the efficiency and processing capabilities of a CPU. [4]

Cache size:

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Clock speed:

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- (ii) State a drawback that may exist by improving both cache size and clock speed. [2]

Cache size:

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Clock speed:

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2. Primary and secondary storage allow for the storage, retrieval and retention of digital data.

(a) Tick (✓) **one** box for each characteristic that matches the correct primary storage type.

[3]

Characteristic	Primary storage			
	ROM	Flash	RAM	Virtual
Retains data when power is turned off, commonly used in memory cards and solid-state drives	☐	☐	☐	☐
A non-volatile memory type that stores programs that do not change	☐	☐	☐	☐
An extension of a computer's physical memory, achieved by simulating additional memory space by using other storage	☐	☐	☐	☐

(b) Complete the following overview of secondary storage characteristics.

[3]

Rank each characteristic in order, using a 4-point scale where:

- 1 is low
- 4 is high

The first row has been completed for you.

Media	Characteristics		
	Durability	Speed	Cost per unit of storage
Blu-ray disc	3	2	4
Magnetic tape			
Flash drive			
Hard disk drive			



C500U101
05

3. (a) Complete the truth table by filling in the missing inputs, outputs and column heading. [5]

A	B	$\overline{A}$	$\overline{A} \oplus B$	
0		1	1	1
	1	1	0	1
1	0	0		0
1	1		1	1

- (b) Simplify the following Boolean expression using Boolean identities and rules. Clearly show each step. [6]
Do not use truth tables to simplify the expression.

$$Y. (X + \bar{Y}) + X. (X + \bar{Y})$$



4. Computer networks are interconnected systems that enable devices to communicate, share resources and collaborate.

(a) State the function of routers, hubs and switches in terms of data transfer.

[3]

Routers

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Hubs

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Switches

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(b) Outline the Open Systems Interconnection (OSI) model.

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5. The Internet is a global network of interconnected computers and devices that enables the exchange of information and communication.

- (a) The following is a Uniform Resource Locator (URL):

https://www.eduqas.co.uk/qualifications/computer-science-gcse/#tab_pastpapers

Describe **two** components of the structure of this URL.

[4]

Component 1:

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Component 2:

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- (b) The URL is typed into the address bar of a browser.

Determine the correct order for the actions, showing how the URL is resolved using the Domain Name System (DNS). [6]

Actions

- A. The IP address is passed to your browser.
- B. If the local DNS server does not hold the IP address, then the query is passed to another DNS server at a higher level.
- C. The browser checks the local (cached) host file to check if it already holds the IP address.
- D. Repeatedly query the URL in servers higher in the hierarchy until the IP address is resolved.
- E. The browser connects to the IP address of the server and downloads the website.
- F. The resolved IP address for the URL is passed on to DNS servers lower in the hierarchy.
- G. The local DNS server is queried for the IP address of the URL.

The first action has been completed for you.

1st

C

2nd

3rd

4th

5th

6th

7th



6. (a) Determine the following:

- (i) The **smallest** denary value that can be represented by a single digit hexadecimal number. [1]

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- (ii) The **largest** unsigned binary value that can be stored in a 4-bit register. Convert the value into denary. [2]

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(b) Carry out binary addition on the following 8-bit binary numbers:

- 01101010
 - 10000111
- [2]

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- (c) Demonstrate how an arithmetic shift right is carried out on the following 4-bit binary number. Describe the impact of the shift. [3]

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7. Consider the following table:

Dec	Hex	Name	Char	Ctrl-Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	0	Null	NUL	CTRL-@	32	20	Space	64	40	@	96	60	.
1	1	Start of heading	SOH	CTRL-A	33	21	!	65	41	A	97	61	a
2	2	Start of text	STX	CTRL-B	34	22	"	66	42	B	98	62	b
3	3	End of text	ETX	CTRL-C	35	23	#	67	43	C	99	63	c
4	4	End of xmit	EOT	CTRL-D	36	24	\$	68	44	D	100	64	d
5	5	Enquiry	ENQ	CTRL-E	37	25	%	69	45	E	101	65	e
6	6	Acknowledge	ACK	CTRL-F	38	26	&	70	46	F	102	66	f
7	7	Bell	BEL	CTRL-G	39	27	'	71	47	G	103	67	g
8	8	Backspace	BS	CTRL-H	40	28	(	72	48	H	104	68	h
9	9	Horizontal tab	HT	CTRL-I	41	29	)	73	49	I	105	69	i
10	0A	Line feed	LF	CTRL-J	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	VT	CTRL-K	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	FF	CTRL-L	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage feed	CR	CTRL-M	45	2D	-	77	4D	M	109	6D	m
14	0E	Shift out	SO	CTRL-N	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	SI	CTRL-O	47	2F	/	79	4F	O	111	6F	o
16	10	Data line escape	DLE	CTRL-P	48	30	0	80	50	P	112	70	p
17	11	Device control 1	DC1	CTRL-Q	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	DC2	CTRL-R	50	32	2	82	52	R	114	72	r
19	13	Device control 3	DC3	CTRL-S	51	33	3	83	53	S	115	73	s
20	14	Device control 4	DC4	CTRL-T	52	34	4	84	54	T	116	74	t
21	15	NeQ acknowledge	NAK	CTRL-U	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	SYN	CTRL-V	54	36	6	86	56	V	118	76	v
23	17	End of xmit block	ETB	CTRL-W	55	37	7	87	57	W	119	77	w
24	18	Cancel	CAN	CTRL-X	56	38	8	88	58	X	120	78	x
25	19	End of medium	EM	CTRL-Y	57	39	9	89	59	Y	121	79	y
26	1A	Substitute	SUB	CTRL-Z	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	ESC	CTRL-[	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	FS	CTRL-\	60	3C	<	92	5C	\	124	7C	
29	1D	Group separator	GS	CTRL-]	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	RS	CTRL-^	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	US	CTRL-`	63	3F	?	95	5F	`	127	7F	DEL

(a) State the content being represented in this table.

[1]



(b) Describe the purpose of this content.

[2]

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(c) Name an alternative representation method. State **two** advantages of this representation method.

[3]

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8. Operating systems manage computer hardware and facilitate user interaction with devices.

- (a) Complete the following sentences about the processes an operating system manages, using only the terms given below.

CACHE

MULTI-TASKING

INTERRUPT

MEMORY

BACKING STORE

PERIPHERAL

INTERFACE

SECURITY

- (i) performs several jobs simultaneously, enabling users to switch between operations without waiting for one to finish. [1]

- (ii) A signal that temporarily suspends the execution of a program to prioritise and handle urgent tasks is called the [1]

- (iii) The is used to save data when the computer's RAM is insufficient for current operations. [1]

- (iv) The operating system manages by ensuring efficient utilisation of storage space to run processes. [1]

- (b) The operating system provides a suite of utility software that enhances system performance.

Describe the functions of the following utility software tools:

- (i) Disk partition editors: [2]

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(ii) Revision control:

[2]

Examiner
only

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9. When booking a flight, Lift-Off's customers complete an online form with their personal details.



LIFT-OFF

Title ▼

First Name

Surname

Date of Birth DD MM YYYY

Passport Number

SUBMIT

Write an algorithm that carries out **five** different validation checks on the fields in the online booking form.

If the data input doesn't meet the criteria of the validation check, a suitable error message should be displayed explaining the error, for example "Please enter a First Name" or "Your Passport Number can only include numbers".

For example, this is a validation check on month (MM):

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1   if month < 1 OR month > 12 then
2       output "Please check the Date of Birth entered"
3   end if

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Note: Passport Numbers must be nine digits long.

[10]

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10. Program translators convert high-level programming code into machine-readable instructions for the computer.

(a) Tick (✓) **one** box for each description that matches the correct translator type. [3]

Description	Translators			
	Assembler	Compiler	Interpreter	Loader
Translates entire high-level code into machine code in a single process	☐	☐	☐	☐
Translates low-level code into machine code	☐	☐	☐	☐
Translates high-level code line by line during runtime	☐	☐	☐	☐

(b) Describe the principal stages involved in the following compilation processes:

(i) Lexical analysis [2]

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(ii) Semantic analysis [2]

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11. Discuss the impact of **two** different pieces of legislation on the use of computer systems. [6]

Legislation 1:

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Legislation 2:

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12. (a) Describe **two** cybersecurity threats to a computer system.

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(b) Describe **two** different methods of protecting against cybersecurity threats.

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