Paper 1

1. Check digits are another validation method. The modulo-11 method multiplies each digit by its digit position, adds the totals together and divides the result by eleven. The remainder is the check digit.
Note: the check digit is digit position 1.

(i) Calculate the check digit (_) for the following number:

3 0 4 5 _

Show your working. **[2]**

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(ii) The employee ID **39421** was entered into the computer as **34921**.
Explain how the check digit validation check will flag **34921** as an invalid employee ID. **[3]**

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(i) Explain how parity check helps to detect errors that occur during communication. Explain the mechanism. **[5]**

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(ii) Describe **one** another verification check that could be used during data transmission. **[4]**

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1. **(a)** Modern computer uses Von Neumann Architecture.
Describe what is meant by Von Neumann Architecture. **[3]**

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Referred to as N, Main memory address: **0110101010101010**

Referred to as M, Accumulator content: **1101010101110101**

Referred to as P, N's content: **1111000011001101**

(b) What are the contents of **MAR** and **MDR** special purpose registers for the following scenarios. **[3]**

Scenario 1: Data is moving from microprocessor to main memory

MAR: .....

MDR: .....

Scenario 2: Data is moving from main memory to microprocessor

MAR: .....

MDR: .....

(c) Describe what each of the following register does.

(i) Program Counter(PC) **[2]**

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(ii) Memory Address Register **[2]**

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(iii) Memory Data Register **[2]**

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(iv) Current Instruction Register **[2]**

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(v) Accumulator **[2]**

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(d) When data is being transmitted around a computer, buses are used.
Name and describe the functions of two different types of buses. **[4]**

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(e)(i) The internal buses in a computer use parallel communication while most peripherals communicate with a computer using serial communication.
Explain the differences between the ways in which parallel and serial communication is carried out. **[2]**

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(ii) Most peripherals, such as printers and keyboards, communicate with a computer using a serial connection.
Apart from the widespread availability of USB (Universal Serial Bus) ports, explain why peripherals usually use a serial communication method such as USB instead of parallel communication. **[2]**

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3. Explain the difference between free software, free ware and shareware. **[6]**

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4. High-level languages require either an interpreter or a compiler to translate the program.
The table below lists a number of statements about language translators.
Tick to show which statements refer to interpreters and which refer to compilers.

Statements	Interpreter (✓)	Compiler (✓)
Translates the source code into machine code all at once		
Produces an executable file in machine code		
Executes a high-level language program one instruction at a time		
Once translated, the translator does not need to be present for the program to run		
An executable file is produced		

[5]

5. (a) Identify the logic gate for the truth table below.

A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

[1]

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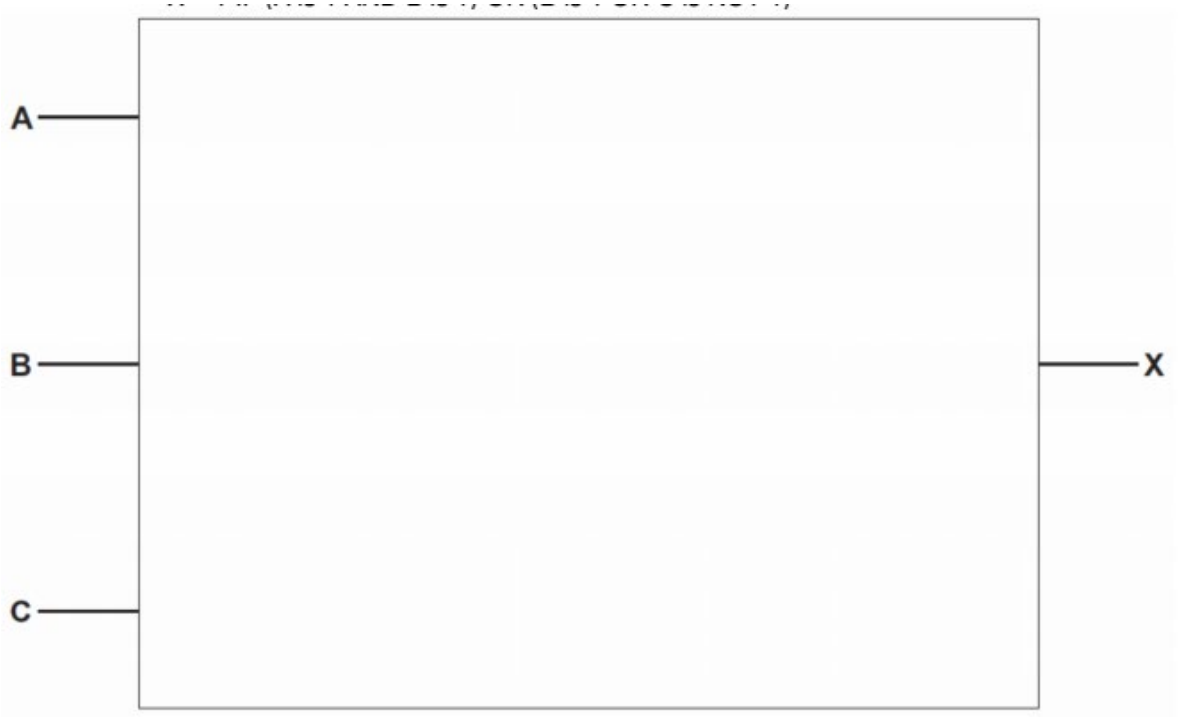
(b) Draw the logic circuit corresponding to the following logic statement:

X = ((A' + B') . (C . B'))'



[6]

(b) Complete the truth table for the above logic statement:

A	B	C	Working Space	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 computer stores data in binary. Convert the following numbers into their respective asked bases.

(a) $(117)_{10} = (??)_{16}$

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(b) $(F52C)_{16} = (??)_{2}$

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(c) $(1001\ 1110)_{2} = (??)_{10}$

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(d) $(262)_{10} = (??)_{2} = (??)_{16}$

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[10]

7. State any five purposes of an operating system. **[5]**

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