Paper 1

1. A local authority has a number of libraries.

(a) When a book is borrowed, a barcode is scanned. A typical barcode is 0351636277. The last digit is a check digit.

(i) Explain how the check digit was calculated. **[5]**

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

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(iii) Describe **two** other validation checks that could be used on the barcode. **[4]**

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

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(b) State the three stages that the processor performs when it receives a task. **[3]**

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(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]

(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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