Worksheet 18.1: for testing basic understanding

1   A feature of CISC processors is the existence of specialised instructions.

   a   Why were these considered to be useful?

   b   Which process was made easier if a CISC processor was used?

2   One type of control unit is described as hard-wired.

   a   What is the main advantage of a hard-wired control unit?

   b   Why is it possible for a RISC processor to be constructed with a hard-wired control unit?

3   An RISC processor has more registers than a CISC processor. Why are registers important to the operation of an RISC processor?

4   What aspects of an RISC processor make it particularly suited to pipelining?

5   Choose the correct word or phrase from the list, A–F, to complete the blank spaces in the following paragraphs.

While a program is being executed, the CPU is receiving a sequence of machine-code instructions. It is the responsibility of the control unit within the CPU to ensure that each machine instruction is handled correctly. There are two ways that a control unit can be designed to allow it to perform its function.

One method is for the control unit to be constructed as a _____ . This is called the _____ solution. The machine-code instructions are handled directly by hardware.
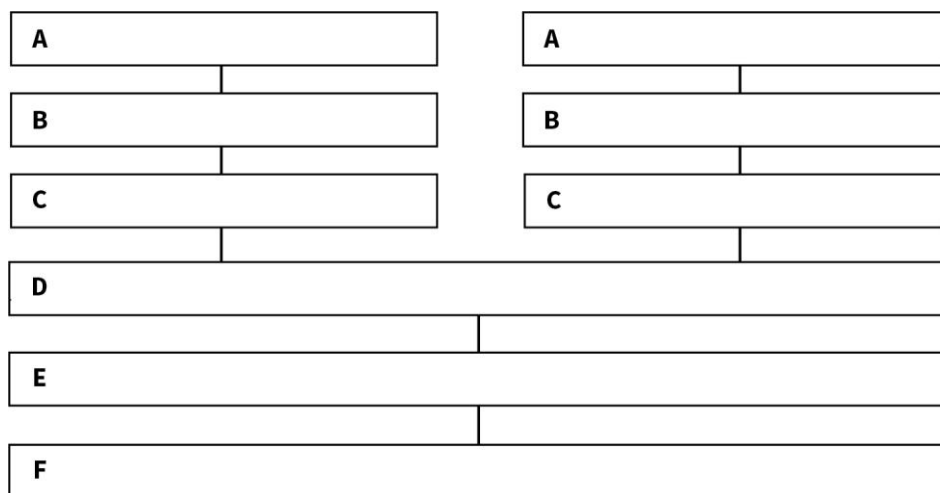
The alternative is for the control unit to use _____ . In this approach, the control unit contains a component in which is stored the _____ for microprogramming. This is often referred to as _____ . The choice of which method is used is largely dependent on the type of processor.

   A   microprogramming

   B   hard-wired

   C   firmware

   D   logic circuit

   E   ROM

   F   microinstructions or microcode

6   Label each item in the list with A if it is typical of RISC or B if it is typical of CISC.

   a   Fewer instructions

   b   Variable-length instructions

   c   Microprogrammed control unit

   d   Many types of instructions to address memory

   e   Multiple register sets

   f   Pipelining easier

   g   Simpler instructions

   h   Many instruction formats

7 Match each name for a type of approach to parallel processing with the correct description.

Massively parallel computers	An approach based on instruction-level parallelism. The fetch–decode–execute cycle is separated into a number of stages.
MIMD (Multiple Instruction Multiple Data stream).	A technology not implemented in single computer systems.
MISD (Multiple Instruction Single Data stream)	Found in early personal computers. There is a single processor with a single memory.
Pipelining	Found in modern personal computers that are of the symmetric multiprocessor type using identical processors. Each processor executes a different individual instruction. Sometimes have a single memory suitably partitioned, sometimes each processor has a dedicated cache memory.
SIMD (Single Instruction Multiple Data stream)	The major feature of the architecture is that instead of having a bus structure to support multiple processors there is a network infrastructure to support multiple computer units. The programs running on the different computers can communicate by passing messages using the network.
SISD (Single Instruction Single Data stream)	The typical arrangement for an array or vector processor. There are multiple processors each having their own memory.

8 The following diagram represents a system using virtual machines:

a What does **A** represent?

b Explain the relationship between **A** and **B**.

c Which letter identifies hardware?

d Which letter represents software that emulates hardware?

e Identify any letters that represent an operating system.

f Why are **A**, **B** and **C** represented twice?