Marks

Question 23 (20 marks) Use a SEPARATE writing booklet.

(a) A small company is designing a database to hold company data. Compare and contrast a custom-designed solution with a customised off-the-shelf package for this company. **4**

(b) A new approach to software development is the production of open-source software. Open-source software development may be characterised by:

- software developers contributing their skills without receiving payment;
- software developers contributing from anywhere around the world to a single project;
- source code being available to anyone;
- the product being available at no cost to any user.

(i) Describe hardware and software developments that have made this development approach possible. **3**

(ii) Discuss the project management issues that might arise from the use of this software development approach. **3**

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Marks

Question 23 (continued)

(c) A given CPU is available to carry out the following instructions.

LOAD (Reg *n*, Mem *x*)	LOAD the register Reg *n* with the contents of memory address Mem *x*
STORE (Reg *n*, Mem *x*)	STORE the value in register Reg *n* in the memory address Mem *x*
ADD (Reg *n*, Reg *m*, Reg *p*)	ADD the values in registers Reg *m* and Reg *p* and store the result in register Reg *n*
STOP	STOP execution

The CPU has three registers — Reg 1, Reg 2, Reg 3.

Data is in hexadecimal format.

Address	Contents
Mem 5	30
Mem 6	A1
Mem 7	F8

The following lines of code are executed.

```
LOAD    (Reg 1, Mem 5)
LOAD    (Reg 2, Mem 6)
ADD     (Reg 3, Reg 1, Reg 2)
STORE   (Reg 3, Mem 6)
STOP
```

After execution:

(i) What is being used as an accumulator? **2**

(ii) What is the hexadecimal value of the contents of Mem 6, and why? **2**

(iii) What is the decimal value in Reg 3? Demonstrate how you arrived at this answer. **2**

(iv) Using the instructions defined above, write code to multiply the contents of Mem 5 by three, and place the result in Mem 7. **4**

End of Question 23