

## Test 1

Please read the following question specification and answer the 7 questions that follow. You can write your answers on both front and back of the question paper. Please label your answer clearly.

All classes need to be minimum and complete. Utilise Model-View-Controller (**MVC**) pattern and use SOLID principles as appropriate.

You can answer on the back of each page if you need more space. Identify and match your answer to the question being answered.

Some of the characteristics of a book are the title, author(s), publisher, ISBN, price, and year of publication.

- Each object of the class *bookType* can hold the following information about a book: title, with at least one author, publisher, ISBN, price, and number of copies in stock. There can be multiple authors for the same book.
- Include member functions to perform the various operations on objects of *bookType* and any constructors or destructors as needed.
- Include helper functions as needed.

A template *Vector* class is used wherever an array is needed. The *Vector* class provides the same functionality as an array with the array being encapsulated inside the *Vector* class. So there is controlled access to the array via the methods of the *Vector* class. The *Vector* class can grow in size as needed.

STL containers and algorithms are **not** allowed. You may use cin, cout, string or stringstream from the std namespace.

1. Draw a detailed UML class diagram for all the above classes.

[15 marks]

2. Write the C++ specification for the *bookType* class. This is the code that goes in *bookType.h*  
[15 marks]

3. Write the C++ implementation for the *bookType* class. This is the code that goes in *bookType.cpp*.

[20 marks]

4. Write the C++ specification for the template *Vector* class. This is the code that goes in *Vector.h*  
[10 marks]

5. Explain the rationale behind each method of the *Vector* class and any helper functions that you may have for any of the classes.
- [5marks]

6. Provide a test plan for the *bookType* class. Show this in a table.

[15 marks]

7. Write a C++ test program to test your *bookType* class. The test program reads data from a text data file. Data for the books come from a file called *books.csv*. Data for each book is stored as a row (record) using comma separated values. You can choose the order of the fields in the data row. As there can be multiple authors, think of how the format can accommodate a varying number of authors for each record.

Explain how your solution is designed to fit the Model-View-Controller (**MVC**) pattern. Your explanation needs to clearly identify which class(es), subroutines (functions, procedures) fit into which part of MVC. You should also explain why they fit into the MVC components.

Using code comments, identify the **SOLID** principles incorporated into your solution.

[20 marks]

**\*\*\*\*End of questions. 2 blank pages follow\*\*\*\***

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