



STRATHMORE UNIVERSITY
SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
Master of Science in Information Systems Security
Final Examination

MST 8104: SOFTWARE LABORATORY EXPERIENCE I

DATE: 9th January 2023

TIME: 2 ¼ hours

Instructions: Answer question one and any other two questions

The owner of a *Bookshop* requires you to develop an application to facilitate the administration of the bookshop activities. The basic requirements specifications for the system to be developed include the ability of Staff and Customers accessing the system, stocking, restocking and dispatch of books and payment of charges. Answer the following questions based on this write-up.

Question 1 (20 Marks)

- a) Define Java classes to illustrate inheritance scenario for such a *Bookshop* software. **(5 Marks)**
- b) At what stage of the application development process would you regard the cost of fixing security concerns to be lowest and why **(2 Marks)**
- c) Describe any two ways that you can apply to ensure that your bookshop software is secure after deployment. **(4 Marks)**
- d) Use an illustration to explain SQL injection. **(3 marks)**
- e) Explain any two ways in which SQL injection can be avoided. **(4 Marks)**
- f) Describe any two call-backs/functions involved in the lifecycle of an Android Activity. **(2 marks)**

Question 2 (15 Marks)

- a) Describe any two factors that can cause vulnerabilities in software. **(4 Marks)**
- b) Write a Java program to illustrate a buffer overflow. **(3 Marks)**
- c) Write a program that uses a foreach loop to fetch data from a collection and display the data on the screen. **(4 Marks)**
- d) One of the requirements for developing the *Bookshop software* is to include proper exception control. From a security perspective, clearly describe two reasons why this is necessary. **(4 Marks)**

Question 3 (15 Marks)

- a) Assuming that the Bookshop software needs to be in the form of a web application. State and briefly describe two software applications required to run the web application **(2 Marks)**
- b) Write a program that uses an Iterator to fetch data from a collection and display the data on the screen. **(4 Marks)**
- c) An Android application contains the following key folders and files. Describe each one of them. **(4 Marks)**
- (i) -assets:
 - (ii) -build:
 - (iii) -src:
 - (iv) - AndroidManifest.xml:
- d) How do you protect an application from SQL injection? **(3 Marks)**
- e) Describe why it is important to keep track of sessions and avoid inserting them into URL strings. **(2 Marks)**

Question 4 (15 Marks)

- a) Assuming that the Bookshop software is to be built as a mobile application, describe any three Activities that you may include to your application. **(3 Marks)**
- b) Assuming the Bookshop software is required to be database-driven. Describe two security considerations that you will make in managing the interaction with the database from the application. **(2 Marks)**
- c) An additional requirement for the *Bookshop software* is to use arrays to store the login session objects for each user who logs in. Describe how this can be a problem and how it can be addressed. **(3 Marks)**
- d) Write code that defines a class for a Book, define two objects of type book and store them in an array of Books. **(5 Marks)**
- e) Describe any two components of the Android Stack. **(2 Marks)**