

TUNKU ABDUL RAHMAN UNIVERSITY OF MANAGEMENT AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

ACADEMIC YEAR 2023/2024

OCTOBER EXAMINATION

**COMPUTER SCIENCE BACS2163**  
**SOFTWARE ENGINEERING**

SATURDAY, 14 OCTOBER 2023

TIME: 9.00 AM – 11.00 AM (2 HOURS)

BACHELOR OF COMPUTER SCIENCE (HONOURS) IN DATA SCIENCE  
BACHELOR OF COMPUTER SCIENCE (HONOURS) IN INTERACTIVE SOFTWARE  
TECHNOLOGY

BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN SOFTWARE SYSTEMS  
DEVELOPMENT

BACHELOR OF SOFTWARE ENGINEERING (HONOURS)

**Instructions to Candidates:**

Answer **ALL** questions. All questions carry equal marks.

**BACS2163 SOFTWARE ENGINEERING****Question 1**

Ani Workshop (AW) is a local car workshop company that has been providing services to customers for over the years. Recognising the need to adapt to the digital age and enhance customer experience, Mr. Mario, the Managing Director of AW has decided to transform AW's manual system into an online system. He requested to launch the core functions such as customer registration, customer login and request car services (repairs and maintenance) in three months.

Furthermore, Mr. Mario wishes to extend the functions which to allow customers to conveniently manage and track car service requests efficiently, view foremen profiles, assign foreman to specific jobs and provide updates to customers regarding the status of their requests in the next version.

As a project manager, you are responsible for developing this proposed online system. Your task is to design and implement the necessary software components and functionalities that align with AW's requirements and objectives. The AW teams are very supportive of this upcoming project. However, there are only two software engineers available to assist you in this project.

- a) Determine whether the above-mentioned online system is a generic or bespoke software product. Give **TWO (2)** reasons for your answer. (1 + 4 marks)

→ bespoke (function extend for specific user)

- b) As a project manager of the software company, explain the most suitable process model to be used in the above scenario. Justify your recommendation with **THREE (3)** reasons. (2 + 6 marks)

→ Incremental process model

- deliver core function modules within 3 months
- increment by increment (gradually extend functions)

- c) Outline any **FOUR (4)** non-functional requirements for the above-mentioned online system. (4 marks)

- Product req
- Organizational req
- External req

- d) Suggest any **TWO (2)** user interface design principles that must be applied in the proposed system. Justify your suggestions. (refer to slides) (4 marks)

- e) As a project manager, you would need to consider the factors that could motivate employees throughout the project. Explain **TWO (2)** motivating factors for this scenario based on the Maslow Motivation Model. (refer to slides) (4 marks)

[Total: 25 marks]

**BACS2163 SOFTWARE ENGINEERING****Question 2**

The Fine Arts Museums of San Francisco is the fourth largest museum in the US and is proud to welcome 1.7 million visitors each year across its two sites comprises the de Young Museum in Golden Gate Park and the Legion of Honor in Lincoln Park. The Fine Arts Museums understood that to sustain their success, they needed to make substantial and fundamental changes to their soon-to-be-retired legacy ticketing system. The existing system has been in use for a number of years and both the museum and digital marketing possibilities had overtaken it. As a proactive organisation, they realised that as part of their digital business strategy, improved museum ticketing system could also transform and advance other areas of their business, especially customer-oriented ones.

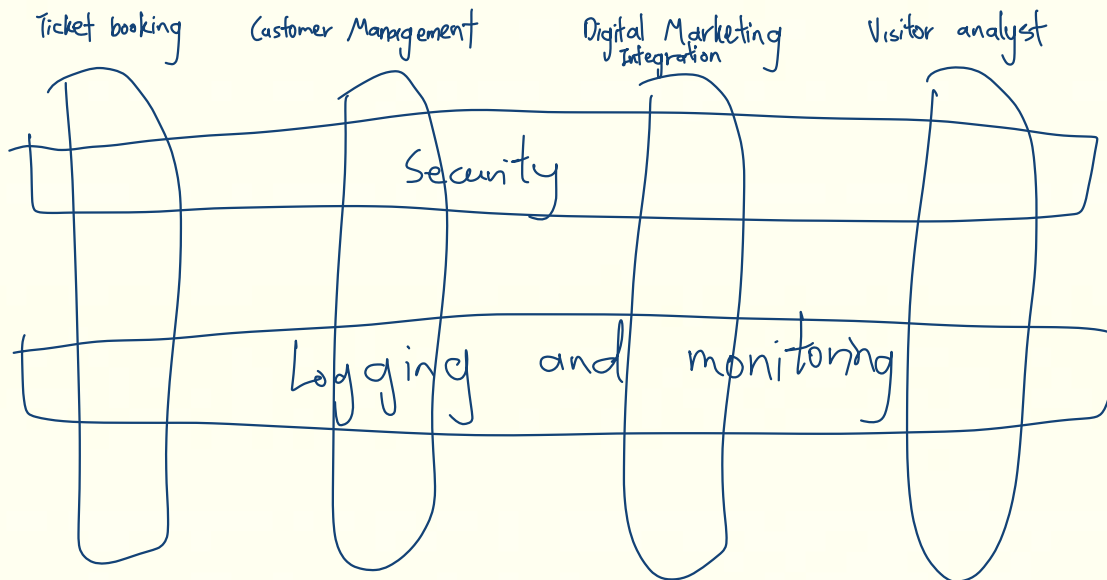
(Retrieved August 13, 2023 and adapted from Major art museum digitally transforms its legacy system, <https://www.cetdigit.com/customer-success/major-art-museum-digitally-transforms-its-legacy-system>)

- a) Discuss **THREE (3)** factors that could affect the maintenance cost of the above legacy system.  
(refer to slides) (must based on scenario) (cannot random choose factors) (6 marks)
- b) Using the "Business Value" and "System Quality" categories for legacy system assessment, explain the technique that they use to maintain the above legacy system. Justify your answer. (4 + 3 marks)  
(Chapter 10) (Draw Legacy System Management Chart) (Give justification) (Answer: Re-engineering / replace)
- c) Assume that a museum decided to re-engineer the legacy system above, propose **ONE (1)** system organisation/structural model. Justify your answer. (6 marks)
- d) Assume that the company has decided to adopt Aspect Oriented Software Engineering (AOSE). Identify a diagram to show **FOUR (4)** core concerns and **TWO (2)** cross cutting concerns for the system. (6 marks)

functional req

non-functional req

[Total: 25 marks]



**BACS2163 SOFTWARE ENGINEERING****Question 3**

Tok Abah Cafe is a small-sized family business that operates about a decade. The main operations in the cafe such as receive meals and drinks order are still performed manually by the staff. To ease the daily operations, Mr. Aziz as the owner of Tok Abah Cafe wants to computerise the order management in the cafe. He plans to enable an online ordering service to the customers.

- a) Illustrate an appropriate **system organisation model** for the above project with justification. (7 marks)
- Handwritten notes for (a):*  
 → layered / repository / client-server ✓  
 Draw the model!  
 (initiate early process to find bug) → (once bug happen just solve it)  
 → proactive, reactive  
 - avoid overloaded situation  
 - cost-effective  
 for programmer  
 white box, black box, top down, bottom up  
 for customers (don't care about how it works)  
 parent ↔ child
- b) Distinguish the software testing strategy, software testing stages, and software testing technique. Support your answer by providing **ONE (1)** example for each component. (6 marks)
- Handwritten notes for (b):*  
 white box testing  
 unit testing, module testing, UAT (alpha / beta), subsystem testing
- c) Explain **TWO (2)** testing techniques that can be used in testing Tok Abah Cafe system. Generate **TWO (2)** test case for each identified testing technique above to assist the testing process by using the following format. (4 + 4 marks)
- Handwritten notes for (c):*  
 test order food

Program Name:					
Test Date:					
No.	Test Case	Test Data	Expected Results	Actual Results	Remarks
1.	Order food	enter food item name	The food is ordered	-	-
2.	Order drink	enter drinks via selecting from list	The drink is ordered		

- d) Based on the scenario above, provide **TWO (2)** justification about the importance of software testing. (4 marks)

[Total: 25 marks]

**BACS2163 SOFTWARE ENGINEERING****Question 4**

Most of colleges and universities use the traditional lighting system, which has a switch to control the lighting. Most of the students and faculty members are habituated towards leaving the classroom without switching off the lights, fan and air-conditioner which leads to unnecessary consumption of energy for organisation and paying huge amount of bill from their budget. Some of the lighting systems have come with remote system towards controlling the lighting and fan similar to air-conditioner which is being used in homes. But still there is a challenge towards leaving the lights and fans unattended when person not in the room. An automatic lighting and control using Arduino for the efficient use of energy in classroom condition by divide the classroom into grids. The system has been developed will control lighting in particular area of classroom based on the presence of human using relay control compared to the one placed in ceiling which would switch on or off based on presence of human in room irrespective of position. In addition to relay control, have also provide mobility and remote command execution to system using Android mobile application via Bluetooth to control lighting based on voice command.

(Retrieved July 18, 2023 and adapted from Automatic lighting and control system for classroom, <https://ieeexplore.ieee.org/document/7892666>)

- a) Explain **TWO (2)** sets of stimuli-responses for the automatic lighting and control system in a classroom. (6 marks)
- Stimuli : people in classroom
  - Response : Room light is on
  - Stimuli : No people around
  - Response : Room light is off
- b) Propose **TWO (2)** functional classification of Computer Aided Software Engineering (CASE) tools with **TWO (2)** specific examples of tools for each classification that can be used by team. (4 + 4 marks)
- ↳ Not cover in syllabus
- student, staff (interactor)  
manager, competitor (indirect) → visit competitor website to make comparison (find out why customer prefer their website)  
UI standard (domain)
- c) Assume that you are planning to adopt a viewpoint-oriented analysis method for the requirements analysis process. Construct **FIVE (5)** viewpoints for automatic lighting and control system. Construct a viewpoint hierarchy to present your viewpoints. You must categorise your viewpoints under three categories with at least one viewpoint under each category. (7 marks)
- interactor, indirect, domain
- d) Discuss **TWO (2)** advantages and **TWO (2)** disadvantages of using viewpoint-oriented analysis method in requirement gathering and analysis. (4 marks)

[Total: 25 marks]

