

THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title	: Software Engineering	Subject Code	: SEHH3143
Session	: Semester Two, 2020/21	Examination Time	: 09:45 – 12:45
Date	: 15 May 2021	Submission Period	: 09:45 – 13:00
Subject Examiner(s)	: Dr Pin NG		

This question paper has a total of **SIX** pages (including this covering page).

Instructions to Candidates:

There are TWO sections in this paper.

Section A (60%) – Short Questions. Answer any SIX out of SEVEN questions in this section in the answer sheet provided. Each question carries 10 marks. If you answer more than six questions, only the first six attempted questions will be marked. Indicate in your answer sheets clearly which six questions you are attempting.

Section B (40%) – Long Questions. Answer ALL questions in this section in the answer sheet provided. Each question carries 20 marks.

Important points to follow:

1. Please type your answers of this Take-home Examination in Microsoft Word.
2. Please strictly follow the **Submission Instructions** posted on Moodle before submission of your answer sheet. In addition,
 - Please make sure that you have submitted the correct and entire file for the subject concerned. Useful information of PDF file generation is available at <http://it-training.cpce-polyu.edu.hk/mod/book/view.php?id=1221>.
 - Please make sure there is no missing page in your submission.
 - The file MUST include (a) full student name, (b) student number, (c) subject code, (d) subject group, (e) page number and (f) total number of pages on EVERY answer sheet.
 - A submission period of 15 minutes is allowed after the examination end time for you to upload your completed answer sheet to Moodle. This is the Submission Deadline, and your answer scripts must be uploaded to Moodle via submission link before this Submission Deadline.
3. Please make sure that each uploaded page of your answer sheet is clearly captured. Only **ONE** single file in **PDF** format with less than **20MB** will be accepted.
4. Late submission via Moodle is not allowed.

5. Only the last submission you made within the designated timeslot will be counted.
6. Declaration of Original Work:

By submitting the answer sheet of this Take-home Examination to the subject lecturer through Moodle, you hereby declare that the work in the answer sheet is completely your own work. No part of the answer sheet is taken from other people's work without giving them credit. All references have been clearly cited.

You understand that an infringement of this declaration leaves you subject to disciplinary actions such as mark deduction, disqualification or even expulsion by the College.

If necessary, students may be invited to provide more information on their submission.

Section A (60%) – Short Questions

Answer any **SIX** out of SEVEN questions in this section in the answer sheet provided. Each question carries 10 marks. If you answer more than six questions, only the first six attempted questions will be marked. Indicate in your answer sheets clearly which six questions you are attempting.

Question A1

software dev model agile method

- (a) Explain the difference between **plan-driven development** and **agile development**. (4 marks)
- (b) Is **agile method** the most effective approach for developing large and safety-critical systems, such as an air traffic control system? Justify your answer. (6 marks)

Question A2

architectural design

- (a) Explain the **importance of architecture pattern** in software development. (2 marks)
- (b) Describe an example of software system that can be developed with **repository architecture**. (4 marks)
- (c) With reference to the example given in part (b), explain the **major drawback of repository architecture** and suggest how we could **reduce the impact** of the drawback. (4 marks)

Question A3

project planning

Given the information of the activities involved in a project as shown below:

ID	Activities	Duration (Weeks)	Preceding activities
A	Requirements analysis	5	—
B	System design	10	A
C	Programming	15	B
D	Telecom setting	5	B
E	Hardware installation	10	B
F	Integration	5	C, D
G	System testing	5	E, F

Assuming that all tasks will start as early as possible, construct a **Gantt chart** for the project. Determine the critical path of the project and the project duration. (10 marks)

Question A4 requirement engineering

Identify the ambiguities or omissions in the following statement of requirements for a library system. (10 marks)

The library system should be simple to learn and use. Library users should be able to search books by book title, author name, subject category, and publication date. There could be more than one copy of a book. Each book will have a unique call number. Library users should be able to check-out and reserve any copy.

The librarian should be able to retrieve information about which books are checked-out by a specific library user and collect fines in the cases of late return.

The library system will send notifications to the library users whenever the reserved books become available, as well as when the book is not returned by the due date.

When borrowing a book, the library user is required to present a library card to the librarian and the system will help the librarian to process the book loan efficiently.

Question A5 software dev model

- (a) If a system is being developed using the waterfall approach, what advice would you give in order to reduce the need for iterations in the process? (5 marks)
- (b) User participation is very important for software development. Describe how users are involved when an incremental development approach is applied. (5 marks)

agile method

Question A6

A program reads in three floating-point numbers. Each number represents the length of one side of a triangle. Based on equivalence partitioning approach, derive some test cases for testing this program. (10 marks)

Question A7 testing

- (a) In the context of software testing, explain the importance of requirements traceability. (5 marks)
- (b) If a software development project is behind schedule, adding more people can help to speed up the progress. Do you agree? Justify your answer. (5 marks)

project plan

- End of Section A -

Section B (40%) – Long Questions

Answer **ALL** questions in this section in the answer sheet provided. Each question carries **20 marks**.

Question B1 design and implementation

- (a) Explain the importance of system modelling. (4 marks)
- (b) A training centre would like to have an information system for handling its daily operations. Use UML class diagram to depict a static model of the system based on the following information. (16 marks)

"There are two types of teaching staff: full-time and part-time staff. The system should maintain the basic information of each teaching staff. That will include the staff ID number, name, title, qualification, office location and telephone number. Full-time teacher will be paid with monthly salary; whereas, part-time teacher will be paid with hourly rate.

Each teaching staff will have to teach one or more training courses. Each course is described with a course code and other information such as, course description, schedule, duration, location and quota. A training course will only be offered if there are at least 5 students enrolled for it.

Each student may take more than one course. Each student will be described with a student ID, student name, address and telephone number."

(Note: You may add any additional attributes or operations whenever appropriate.)

Question B2

testing

- (a) In basis path testing (one of the white-box testing techniques), we need to calculate the cyclomatic complexity of the flow graph. What is the significance of cyclomatic complexity in the context of software testing? (4 marks)
- (b) Based on the following specification, construct a flow graph, calculate the cyclomatic complexity, and trace all independent paths. (16 marks)

```

main_module( ) {
    While (condition a)
        procedure y
        If ( condition c or condition b ) {
            procedure x
            If (condition d and ( condition e or condition f ) ) {
                procedure q
            }
            procedure k
        }
        Else
            procedure z
        }
        procedure t
    } // end While
}

```

- End of Section B -

- END OF PAPER -