

THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title : Software Engineering	Subject Code : CCN3143
Session : Semester Two, 2017/18	Time : 14:00 – 17:00
Date : 18 May 2018	Time Allowed : 3 Hours
Subject Examiner(s) : Dr Pin NG	

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

Instructions to Candidates:

1. There are **THREE** sections in this paper.
 - Section A (30%) – Multiple-choice Questions. Answer **ALL** questions in this section on the multiple-choice answer sheet provided. Each question carries 1 mark.
 - Section B (30%) – Short Questions. Answer any **FIVE** out of the SIX questions in this section in the answer book provided. Each question carries 6 marks. If you answer more than **FIVE** questions, only the first **FIVE** attempted questions will be marked. Indicate in your answer book clearly which five questions you are attempting.
 - Section C (40%) – Long Questions. Answer any **TWO** out of the THREE questions in this section in the answer book provided. Each question carries 20 marks. If you answer more than **TWO** questions, only the first **TWO** attempted questions will be marked. Indicate in your answer book clearly which two questions you are attempting.
2. For Section B and Section C, begin each question on a fresh page in the answer book provided.
3. Candidates are **NOT** allowed to retain the multiple-choice answer sheet, the answer book and the examination question paper.
4. Show all your work clearly and neatly. Marks will be deducted for untidy work.

Authorised Materials:

	YES	NO
CALCULATOR	[]	[✓]
SPECIFICALLY PERMITTED ITEMS	[]	[✓]

DO NOT TURN OVER THE PAGE UNTIL YOU ARE TOLD TO DO SO



Section B (30%) – Short Questions

Answer any **FIVE** out of the **SIX** questions in this section in the answer book provided. Each question carries 6 marks. If you answer more than **FIVE** questions, only the first **FIVE** attempted questions will be marked. Indicate in your answer book clearly which five questions you are attempting.

Question B1 requirement engine

- (a) What are the differences between functional and non-functional requirements? (2 marks)
- (b) In the context of an online subject registration system, suggest:
 - (i) **TWO** examples of functional requirements (2 marks)
 - (ii) **TWO** examples of non-functional requirements (2 marks)

Question B2 intro

- (a) In general, software products can be classified into generic software and custom software. Suggest **ONE** example for **EACH** type of software. (2 marks)
- (b) Explain the differences between generic software product development and custom software development. (4 marks)

Question B3 testing

- (a) In the context of software testing, explain **EACH** of the following terms.
 - (i) Verification (1 mark)
 - (ii) Validation (1 mark)
- (b) What is the main difference between white-box testing and black-box testing? (4 marks)

Question B4 evolution

Briefly describe the **THREE** main types of software maintenance and give an example for each of them. (6 marks)



Question B5 software dev model

Suggest an appropriate software development process model that can be applied in developing each of the following systems. Give some reasons to justify your choices.

- (a) A library information system for a secondary school (2 marks)
- (b) A high-speed railway operation system (2 marks)
- (c) A web-based system for a chained fast food restaurant (2 marks)

Question B6 design and implementation

- (a) What is the meaning of open source development? (2 marks)
- (b) In the context of open source development, explain the difference between GNU General Public License (GPL) and Berkley Standard Distribution (BSD) License. (4 marks)

- End of Section B -

Section C (40%) – Long Questions

Answer any **TWO** out of the **THREE** questions in this section in the answer book provided. Each question carries 20 marks. If you answer more than **TWO** questions, only the first **TWO** attempted questions will be marked. Indicate in your answer book clearly which two questions you are attempting.

Question C1

testing

With reference to the following specification, perform the tasks in parts (a), (b) and (c).

```

my_module() {
    If ( condition n and condition m ) {
        process t
        While ( condition a ) {
            process x
            If ( ( condition d and condition f ) or condition e ) {
                process q
            }
            process k
        } // end While
    }
    Else {
        process z
    }
}

```

- (a) Construct a flow graph. (10 marks)
- (b) Based on the flow graph in part (a) of this question, determine the cyclomatic complexity. (2 marks)
- (c) What is the number of independent paths? Trace for all the independent paths. (8 marks)

Question C2 **system modeling**

- (a) What is the main purpose of system modeling? (2 marks)
- (b) Explain the usages of UML class diagram. (3 marks)
- (c) In developing a hotel reservation system, you are required to use UML class diagram to model the system with reference to the following information:

“Members can reserve hotel rooms of an alliance of hotels through the hotel reservation system. There are two types of membership: personal member and company member. The system should maintain the basic information of each member including member ID and name. For company members, additional information about the contact person and discount rate will be stored.

Each member may make many bookings whereas each booking can only be made by one member. In each booking, we have to record the reference number, date of booking, check-in date, check-out date, and payment information. Each booking can only concern one hotel whereas each hotel may be related to many bookings. Each hotel is described with the hotel name, address, telephone number, ranking, and room rate. Once the system has checked that the requested rooms are available, the booking will be confirmed. Otherwise, the booking will be cancelled.”

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

(15 marks)



Question C3**project planning**

The expected duration of each activity involved in a software development project is given below.

Activity	Description	Expected Duration (weeks)	Preceding activities
A	Analysis of the current system	3 weeks	-
B	Gather new requirements	4 weeks	A
C	Prepare the requirements specification	6 weeks	B
D	Design the new system	8 weeks	C
E	Develop client modules	6 weeks	D
F	Develop server modules	8 weeks	D
G	Develop data conversion module	2 weeks	D
H	Setup new hardware infrastructure	12 weeks	C
I	Data conversion for the new system	2 weeks	G
J	System integration	4 weeks	E, F, H, I
K	System testing	2 weeks	J

- (a) Plot a Gantt Chart for representing the overall project schedule against a timeline. (13 marks)
- (b) Determine the critical activities of the project and the overall project duration. (3 marks)
- (c) Determine the impact to the project if Activity H requires three extra weeks to be completed. (2 marks)
- (d) Determine the impact to the project if Activity F requires one extra week to be completed. (2 marks)

- End of Section C -

- END OF PAPER -