THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title	: Software Engineering	**Subject Code**	: CCN3143
Session	: Semester Two, 2016/17	**Time**	: 09:30 - 12:30
Date	: 16 May 2017	**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

Software testing involves several activities. Explain **EACH** of the following testing activities:

(a) Unit testing (2 marks)

(b) Stress testing (2 marks)

(c) Acceptance testing (2 marks)

Question B2

(a) Explain the meaning of open source approach for software development. (2 marks)

(b) Give **ONE** example of open source product and describe its main usage. (2 marks)

(c) Some users think that "open source software is less secure than proprietary software". Comment on this statement. (2 marks)

Question B3

Figure 1 shows a flow graph based on a program specification. Calculate its cyclomatic complexity and trace all independent paths. (6 marks)

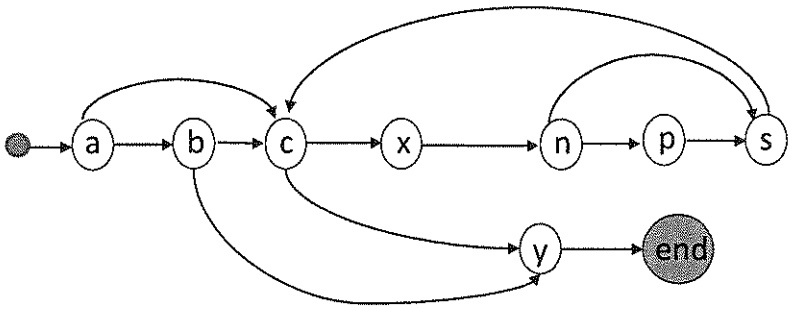

Figure 1

Question B4

Use a UML activity diagram to model the process of hotel room reservation as specified below:

"In making a reservation, you have to, first, select a hotel. Then, you will be asked to input check-in and check-out dates, personal information, and payment information. After all these three categories of information have been filled in, the system will start checking for the availability of the hotel room. In case no hotel room is available, the request will be rejected. If the hotel room is available, the system will further process the payment. Under normal situation, after the payment has been confirmed, the reservation will be made. If the payment is not valid, the request will be rejected and the service will be terminated."

(6 marks)

Question B5

Functional and non-functional requirements are the major constituent elements to the software requirements specifications.

(a) What are the differences between functional and non-functional requirements? (4 marks)

(b) Give **ONE** example for each of these two categories of software requirements. (2 marks)

Question B6

(a) Some project managers said that "adding manpower to a late software project makes it later". Do you agree? Justify your answer. (2 marks)

(b) Other than adding manpower, suggest **TWO** options to manage a software project if it is going to be late. (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

(a) Suggest an appropriate software development process model for developing each of the following systems. Justify your choices. (8 marks)

(i) Air traffic control system for an international airport.

(ii) A payroll system for a medium sized company.

(iii) An innovative e-learning system

(iv) An information system for a large-scale logistic information system which consists of several implementation phases.

(b) During an initial analysis of developing a ticket selling machine, the following information has been attained:

"The ticket selling machine is mainly used for selling tickets of some events. An event is either a movie or a concert. Each ticket selling machine consists of a touch screen interface, a credit card reader, and a ticket printer. The ticket printer is used for printing the tickets for the events."

With the information given, identify the possible candidate object classes and model the relationships among the object classes with UML class diagram notations. (Note: you are **NOT** required to specify the attributes and operations of the object classes.)

(12 marks)

Question C2

A software development project adopted the incremental development approach, in which, three increments have been planned.

For each increment, after the detailed requirements analysis, it can be developed accordingly. Once an increment has been developed, it will be validated and integrated with previous increments. During the development of an increment, the requirements analysis for the next increment can take place concurrently. The schedule of the activities is as follows:

Activity	Description	Expected Duration (weeks)	Preceding activities
A	Requirements analysis for Increment I	4	-
B	Development of Increment I	6	A
C	Validation of Increment I	4	B
D	Requirements analysis for Increment II	4	A
E	Development of Increment II	8	D
F	Integration of Increments I and II	6	C, E
G	Validation of Increments I and II	4	F
H	Requirements analysis for Increment III	6	D
I	Development of Increment III	8	H
J	Integration of Increments I, II and III	6	G, I
K	Validation of Increments I, II and III	4	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) If Activity E is completed four weeks earlier, determine the impact to the overall project duration. (2 marks)

(d) If Activity I requires two extra weeks to complete, determine the impact to the overall project duration. (2 marks)

Question C3

The following program specification describes a module for determining the smallest value among three integers.

```
int smallest(int x, int y, int z) {
    int s;
    if (x < y)
            s = x;
    else
            s = y;
    if (z < s)
            s = z;
    return s;
}
```

(a) Based on the above specification, construct a flow graph. (8 marks)

(b) Given the flow graph constructed in part (a), trace all its independent paths. (6 marks)

(c) With reference to the results in part (b), suggest a set of test cases, with expected results, for testing the module. (6 marks)

- End of Section C -

- END OF PAPER -