THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title	: Software Engineering	**Subject Code**	: CCN3143
Session	: Semester Two, 2015/16	**Time**	: 14:00 – 17:00
Date	: 15 May 2016	**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 <u>THREE</u> sections in this paper.
   Section A (30%) – Multiple-choice Questions. Answer <u>ALL</u> questions in this section on the multiple-choice answer sheet provided. Each question carries 1 mark.
   Section B (30%) – Short Questions. Answer any <u>FIVE</u> out of the SIX questions in this section in the answer book provided. Each question carries 6 marks.
   Section C (40%) – Long Questions. Answer any <u>TWO</u> out of the THREE questions in this section in the answer book provided. Each question carries 20 marks.
2. For Section B and Section C, begin each question on a fresh page in the answer book provided.
3. Candidates are <u>NOT</u> 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 more than **FIVE** questions are answered, only the first **FIVE** questions answered will be marked.

Question B1

(a) What is the aim of agile methods? (2 marks)

(b) State and explain **FOUR** important principles of agile methods. (4 marks)

Question B2

(a) What is the difference between user requirements and system requirements? (4 marks)

(b) In relation to an online education system, give **ONE** example of user requirement and **ONE** example of system requirement. (2 marks)

Question B3

(a) In extreme programming, software requirements are expressed as "user stories". State **TWO** advantages of using such approach. (2 marks)

(b) State machine models and activity diagrams are often used to model the dynamic properties of system being designed. Explain the difference between State machine model and activity diagram. (4 marks)

Question B4

(a) What is the main purpose of software testing? (2 marks)

(b) In the context of software testing, explain the differences between verification and validation. (4 marks)

Question B5

Explain the characteristics of the following test cases design approaches:

(a) Requirements-based testing (2 marks)

(b) Partition testing (2 marks)

(c) Structural testing (2 marks)

Question B6

(a) What are the major usages of a software project plan? (2 marks)

(b) In the context of project scheduling, explain the meaning of the following terms and give **ONE** example for **EACH** of them.

    (i)   Milestones (2 marks)

    (ii)   Deliverables (2 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 more than TWO questions are answered, only the first TWO questions answered will be marked.

Question C1

(a) Software testing involves several activities. Explain **EACH** of the following testing activities.

    (i)   Unit testing   (2 marks)

    (ii)   Component testing   (2 marks)

    (iii) System testing   (2 marks)

(b) When conducting basis path testing, what is the major purpose of calculating the cyclomatic complexity?   (3 marks)

(c) Describe the **THREE** basic methods of calculating the cyclomatic complexity of a flow graph.   (3 marks)

(d) Figure 1 shows a flow graph based on a program specification. Calculate its cyclomatic complexity, and trace all independent paths.   (8 marks)
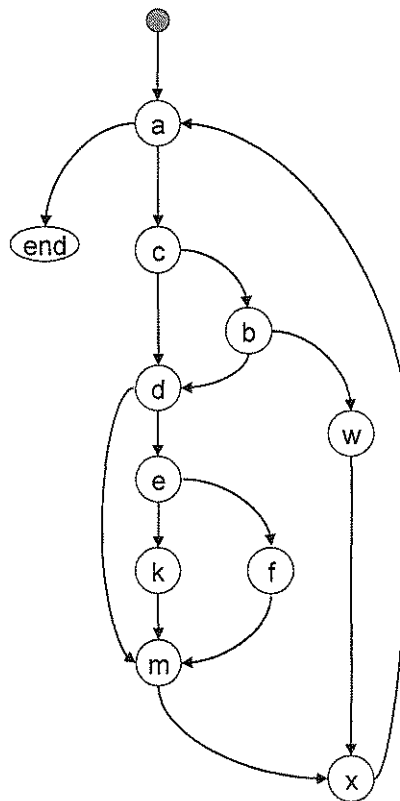

Figure 1

Question C2

(a) Discuss why the process of project planning is iterative and the project plan must be continually reviewed during a software development project. (4 marks)

(b) Suppose that the sports car development project consists of the following eight activities:

Ref.	Activity	Duration (weeks)	Predecessor activities
A	Formation of design team	2	-
B	Sports car engine design	6	A
C	Design of the sports car outlook	8	A
D	Testing of the engine components	4	B
E	Engineering the sports car	2	C, D
F	Testing of the sports car	4	E
G	Making of advisement	10	C
H	Marketing and promotion	2	F, G

(i) Sketch a Gantt chart for the project. (10 marks)

(ii) Identify the critical activities and determine the overall project completion time. (2 marks)

(iii) For **EACH** of the following situations, determine how the overall project completion time would be affected:

- Activity E is delayed by 4 weeks. (2 marks)

- Activity G is completed 4 weeks earlier. (2 marks)

Question C3

(a) State the **FOUR** essential activities commonly involved in various software development process models. (4 marks)

(b) For each of the following systems, suggest an appropriate software development process model that could be applied for developing such system. Explain and justify your suggestions.

   (i) A payroll system for a company with well specified standard requirements. (2 marks)

   (ii) A control system for a high speed railway system. (2 marks)

   (iii) An e-banking system which consists of several major components including banking services, investment services, personal loan services, and insurance services. (2 marks)

(c) Implementing and managing change to their existing software systems are major problems for organizations. State **FOUR** reasons for explaining the fact that software change is inevitable. (4 marks)

(d) Briefly describe the **THREE** major types of software maintenance. (6 marks)

- End of Section C -

- END OF PAPER -