

PAPER CODE NO.
COMP 319

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THE UNIVERSITY
of LIVERPOOL

JANUARY 2006 EXAMINATIONS

Bachelor of Arts : Year 3
Bachelor of Engineering : Year 3
Bachelor of Science : Year 2
Bachelor of Science : Year 3
Master of Engineering : Year 4
No qualification aimed for : Year 1

COMP319 : SOFTWARE ENGINEERING II

TIME ALLOWED : TWO HOURS AND A HALF

INSTRUCTIONS TO CANDIDATES

SECTION A: ANSWER ALL QUESTIONS
(Section A is worth 50%)

SECTION B: ANSWER 2 OUT OF 4 QUESTIONS
(25 marks for each answer; Section B is worth 50%)

If you attempt to answer more than the required number of questions in Section B, the marks awarded for the excess questions will be discarded starting with the lowest mark.

Section A

Answer ALL questions in Section A. Section A is worth 50% of the marks available.

A1

Provide a brief analysis of the "Software Engineering Crisis" identified by F.P Brooks and others and outline some of the solutions proposed at that time.

(5 marks)

A2

Using a programming language with which you are familiar sketch a program that illustrates the software engineering principle of *incremental organic growth* in developing a computer interaction interface. Explain how your program allows incremental organic growth to occur.

(5 marks)

A3

In software engineering what is the *constraint triangle* and comment on when it might be ignored?

(5 marks)

A4

The review at the end of the second month of a software engineering project determines that there has been slippage of one month. Assume that the project must be completed on time and that the original estimates were 3 men for 12 man months. Explain what strategies are available to remedy the situation?

(5 marks)

A5

Describe the software productivity measure introduced by Garmus and Herron (2000) and termed *Function point analysis*. What are the drawbacks to the approach?

(5 marks)

A6

In software engineering what is meant by an *object oriented design pattern*. With reference to one design pattern with which you are familiar describe the pattern documentation that might be available.

(5 marks)

A7

What is meant by the *agile method approach* to software development? Would such an approach be suitable for making significant changes to a databased web portal?
(5 marks)

A8

In building computer aided software engineering tools what kinds of issue are likely to be paramount in your thinking? Illustrate your answer with reference to CASE tool with which you are familiar.
(5 marks)

A9

In ubiquitous computing research faults are a key concern. Describe why this might be the case and explain briefly how the problem is tackled.
(5 marks)

A10

You are required to produce a software engineering environment that requires a new biological development programming language. Discuss the suggestion that a formal language grammar and in particular a L-system approach be used to satisfy the requirement.
(5 marks)

Section B

Answer 2 questions in Section B. Section B is worth 50% of the marks available.

B1

- (a) What is CoCoMo and how is CoCoMo I different from CoCoMo II?
(10 marks)
- (b) Describe briefly the 4 main types of CoCoMo II model concentrating on where each model is best used.
(15 marks)

B2

- (a) The Lifelines program is considered among the best genealogical systems currently available and yet has been developed in what has been classified by Eric Raymond as an "unconventional" approach. Describe with examples the main features of the approach and suggest why it works.
(8 marks)
- (b) Explain (in your opinion) what marks out the success or otherwise of its use in the Lifelines project.
(7 marks)
- (c) Would a more conventional approach have been appropriate for the Lifelines development?
(10 marks)

B3

- (a) Describe Mark Weiser's "Waves of computer use" and outline the key features of the "third wave".
(5 marks)
- (b) Describe the software engineering environment in which the third wave might be delivered.
(5 marks)
- (c) Briefly outline the "delivery debate" associated with the third wave and comment on Weiser's four myths.
(8 marks)
- (d) The coming of the third wave will change our assumptions concerning the software engineering environment. Discuss these changes and comment on the research issues they raise.
(7 marks)

B4 A C main program and function that sums a series of integers is presented below:

```
1     void main() {
2         int i = 1;     int sum = 0;
3         while (i<11) {
4             sum = add(sum, i);
5             i = add(i, 1);
6         }
7         printf("sum = %d0, sum);
8         printf("i = %d0, i);
9     }
10
11     static int add(int a, int b)
12     {
13         return(a+b);
14     }
```

- (a) Sketch the intermodular program dependency graph for the program outlined above taking care to annotate all the elements in your sketch. (10 marks)
- (b) What would appear in a backward slice from the statement in line 8. (7 marks)
- (c) Which program slicing method would be most appropriate to investigate modification of line 3 to allow the constant 11 to be changed for the variable j , initialised in a new statement just before the while loop. (8 marks)