UNIVERSITY OF SWAZILAND
FINAL EXAMINATION, MAY 2013

Title of Paper : SOFTWARE ENGINEERING - II

Course number : CS 452

Time allowed : Three (3) hours.

Instructions : (1) Read the whole paper before start writing your answers.

(2) **Question one is compulsory.** Answer **any other three** Questions from Q2 to Q5. This paper has pages 1 to 4.

(3) Use correct notations / structures and show all your work on the answer script.

This paper should not be opened until the invigilator has granted permission.

NOTE: Q1 is compulsory.

Q1. (Marks 10 + 5 + 5 + 5 + 15). A very basic calculating toy – Buddy, for teaching numeracy to infants, is to be developed. The Buddy can perform five simple binary arithmetic operations (ADD, SUBTRACT, MULTIPLY, DIVIDE (integer division - DIV), MODULUS (MOD) and two relational operations (LESS THAN OR EQUAL TO (<=) and GREATER THAN OR EQUAL TO (>=)) on two positive integer operands. The Buddy has a start and a stop button and can be used in the following two modes –

Learn mode: (1) The user selects the operation, (2) the user gives two integer operands and (3) Buddy displays the corresponding result. Steps 2 and 3 are repeated until the user quits the learn mode.

For example – if the user selects 'ADD'and operands given are 5 and 4,

the Buddy displays the result as 5 + 4 = 9 and continues.

Test mode: (1) The user selects the operation, (2) the Buddy shows two random integer operands and (3) the user enters the result. (4) if the result entered is correct, a pleasing encouraging message is displayed, otherwise a sorry message is displayed and correct result is told. Steps 2 and 4 are repeated until the user quits the test mode.

For example – if the user selects 'MULTIPLY' and random operands given by Buddy are 8 and 5, the result entered is correct (i.e. say 40),

Buddy displays – 8 * 5 = 40 and the message

WELL DONE, YOUR RESULT IS CORRECT,

otherwise if the result entered is incorrect (i.e. say 50),

Buddy displays – 8 * 5 = 50 and the message

SORRY! YOUR ANSWER IS INCORRECT, THE CORRECT RESULT IS – 8 * 5 = 40 and continues.

Q1 (a). Describe the five layers of the Object Oriented Analysis and analyze the structure and functionality of the Buddy in detail.

Q1 (b). Write a good layout of the GUI of Buddy with appropriate controls / displays / captions and labels.

Q1 (c). Write a suitable Problem Domain Component (PDC) for the Buddy.

Q1 (d). Write a suitable Human Interaction Component (HIC) for the Buddy, showing PDC and HIC connections.

Q1 (e). Write pseudo code and implementation details of Buddy of all the control events and main program/s.

Q2. (Marks 5 + 5 + 5 + 5). Strong Cohesion and loose coupling are two qualitative good structural design criteria. Discuss and explain in detail the seven different levels of 'Cohesion' of increasing strengths and five different types of 'Coupling' from tightest to loosest.

Q3 (a). (Marks 3 + 3 + 3 + 3). Define and explain the following –

(i). Corrective maintenance

(ii). Adaptive maintenance

(iii). Perfective maintenance

(iv). Preventive maintenance

Q3 (b). (Marks 4 + 4) From a Software professional's point of view differentiate between 'Functional maintenance' and 'Functional development'. Discuss the activities and write –

(i). When the professional is a member of maintenance team.

(ii). When the professional is a member of development team.

Q4. (Marks 10 + 5 + 5). Describe the problem of producing a 'Key Word In Context – KWIC' index in a library automation system and briefly discuss its solution. Discuss and evaluate the commonly used architectures using the example of KWIC index problem solution. Differentiate between a Design Pattern and an architectural style.

Q5. (Marks 10 + 10). Discuss in detail **any two** of the following with example/s –

(1). Coverage-based, Fault-based and Error-based testing techniques

(ii). McCabe's Cyclomatic Complexity.

(ii). Reverse Engineering, Restructuring and Reengineering.

(End of Examination Paper)