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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

SECOND SEMESTER M.TECH (SOFTWARE ENGINEERING) DEGREE
END SEMESTER EXAMINATIONS-APR/MAY 2017
SUBJECT: SOFTWARE ARCHITECTING and SOFTWARE TESTING (ICT 5222)
(REVISED CREDIT SYSTEM)

TIME:3 HOURS 22/04/2017 MAX. MARKS: 50

Instructions to candidates

- Answer **ALL** questions.
- Missing data if any, may be suitably assumed.

1A. Identify the feasible equivalence classes for the control software of Boiler Control System, abbreviated as CS. Also design the test suite for the same. CS is required to offer several options. One of the options, C (for control), is used by a human operator to give one of four commands (cmd): change the boiler temperature (temp), shut down the boiler (shut), and cancel the request (cancel). Command temp causes CS to ask the operator to enter the amount by which the temperature is to be changed (tempch). Values of tempch are in the range -10..10 in increments of 5 degrees Fahrenheit. An temperature change of 0 is not an option. Selection of option C forces the BCS to examine variable V. If V is set to GUI, the operator is asked to enter one of the three commands via a GUI. However, if V is set to file, BCS obtains the command from a command file. The command file may contain any one of the three commands, together with the value of the temperature to be changed if the command is temp. The file name is obtained from variable F. Assume that the control software is to be tested in a simulated environment. The tester takes on the role of an operator and interacts with the CS via a GUI. Values of V and F can be altered by a different module in BCS. [5]

1B. Consider a simple search program which accepts the length of a string, a string and the character to search for in the entered string as inputs from the user. If the entered string length is out of range an error message will appear. If the character appears in the string its position will be reported. If the character is not in the string "not found" message will be the output. Write cause effect graph for the program and derive test cases for testing the program based on the cause effect graph. [3]

1C. Write and explain all portions of quality attribute scenario for the following event: "An unanticipated external message is received by a process during normal operation. The process informs the operator of the receipt of the message and continues to operate with no downtime". [2]

2A. Consider the sensitization of a CFG that consists of sequential concatenation of two subgraphs G1 and G2. Each G1 and G2 contains a binary branching with conditions C1 and C2 respectively. Discuss the possible sensitization issues for the following.

i. $C1 \implies C2$ (E.g. : $(x > 100) \implies (x >= 0)$)
ii. C1 and C2 are disjoint (E.g. :$C1 \equiv (0 <= x <= 10), C2 \equiv (50 <= x <= 200)$)
iii. $C1 = \neg C2$ iv. C1, C2 are unrelated [5]

2B. Write the motivation of Active Object design pattern. Also, explain its main elements [3]

2C. Explain any two non functional and any one functional testing techniques that are applicable to web testing and the possible integration of them to effectively assure quality from the perspective of the user. [2]

3A. Design FSM based test cases for a simple calculator application. The calculator supports four basic operations $+, -, *, \div$. To support these operations the interface of the calculator is composed of 10 buttons with digits (0 to 9) and four buttons for basic operations $(+, -, *, \div)$. A button "C" to reset the display and "=" button to display the result along with "ON" and "OFF" buttons. The sequence to be followed for performing the basic operation is "operand1 entry, operator entry, operand2 entry, and result display". Other relevant transitions can be assumed. [5]

3B. Explain how Architecture Business Cycle(ABC) works in Software Process? [3]

3C. Bring out the difference between the following:
i. Coverage based Testing and Usage based Testing
ii. Fault and Error [2]

4A. Explain the following:
i. Architecture reconstruction activities
ii. runtime tactics to achieve usability [5]

4B. Write pseudo-code for quick sort and design test cases using control flow testing. [3]

4C. With suitable examples explain one business quality and one architecture quality apart from the system qualities. [2]

5A. Consider a two-dimensional hexagonal shape which is often used to depict the coverage areas for cell-phone transmission towers. For the above said shape, which among the EPC, weak N X 1 or weak 1 X 1 boundary testing strategy detects the boundary problems efficiently? Explain. [5]

5B. Write and explain all portions of quality attribute scenario for the following event: "A developer wishes to change the user inteface to make a screen's background color blue. This change will be made to the code at design time. It will take less than three hours to make and test the change and no side effect changes will occur in the behaviour". [3]

5C. Write the DDG and its data slices for the following program segment.

```
print " Best Wishes "
if date= "24-03-2017" then
print"All the BEST"
end if
print "The date is: " date
print " bye "
end
```

[2]