MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VII SEMESTER B.TECH.

END SEMESTER EXAMINATIONS

SUBJECT: SOFTWARE TESTING AND ANALYSIS [CSE 4076]

Time: 2.30-5.30 PM Date: 09/12/2023 MAX.MARKS: 50

Note: Missing data may be assumed suitably.

Q. No	Questions	Marks
1A.	Discuss the importance of testing in the software development life cycle. Additionally, explain why exhaustive testing is not practically feasible in most cases.	**4**
1B.	A desert cooler sales person sold cooler fans, pumps and bodies that were made by a cooler maker. Fans cost $45, pumps cost $30 and bodies cost $25. The salesperson had to sell at least one complete cooler per month, and the production limits were such that the most the sales person could sell in a month was 70 fans, 80 pumps and 90 bodies. The sales person used to send the details of sold items to the cooler maker. The cooler maker then computed the sales person's commission as follows: 1) 10% on sales up to and including $1000. 2) 15% of the next $800. 3) And 20% on any sales in excess of $1800. The commission program produced a monthly sales report that gave the total number of fans, pumps and bodies sold, the sales person's total dollar sales and finally, the commission. How are BVA test cases selected for this problem?	**3**
1C.	Considering a scenario, to classify a triangle. Its inputs is a triple of positive integers (say x, y, z) and the data type for input parameters ensures that these will be integers greater than 0 and less than or equal to 100. The program output may be one of the following words: [Scalene; Isosceles; Equilateral; Not a triangle]. Identify when it is appropriate to use Boundary Value Analysis (BVA) testing? How would you use BVA in the above given context?	**3**
2A.	An airline offers only flights to India and Asia. Under special conditions, a discount is offered on the normal airfare: • Passengers older than 18 with destinations in India are offered a discount of 20%, as long as the departure is not on a Monday or Friday. • For destinations outside of India, passengers are offered a discount of 25%, if the departure is not on a Monday or Friday. • Passengers who stay at least 6 days at their destination receive an additional discount of 10%. • Passengers older than 2 but younger than 18 years are offered a discount of 40% for all destinations. • Children 2 and under travel for free.	**4**

	For the given requirements, design a decision table and write the test cases based on the table.	
2B.	Demonstrate how equivalence class testing can be used to enhance test coverage compared to BVA w.r.t a program that computes square of a given input number where input is in the range 1 to 10.	**3**
2C.	Consider a program to add two-digit integers. Can we test the program completely? If so, how many test cases are required? Assume that each test case can be executed and analyzed in one second; how long would it take to execute all test cases?	**3**

3A.	Consider following C code:
	`int foo () {`
	`  int a, b, z = 0, count = 1, y = -1;`
	`  scanf("%d %d %d %d", &a, &b,&z,&y);`
	`  if (a < 100 || b > 200) {`
	`  if (z < (a + b) && (z > count || y!= -1)) {`
	`  count++;`
	`  y += 2;`
	`  printf ("Inside decision true");`
	`  } else {`
	`  count = count - 2;`
	`  y--;`
	`  printf ("Inside decision false");`
	`  }`
	`  }`
	`else {z++; printf ("outside decision false");`
	`  return 0;`
	`}`
	Derive a test suite for each of the following
	• To achieve 100% branch coverage
	• To achieve 100% condition coverage
	• To achieve 100% statement coverage
		5

3B.	Consider a function given below: List the P-use, C-use and Definitions of all the variables used and give the DU pairs for each variable.
	`1 int GCD (int a, int b)`
	`2 {`
	`3 while (a ! = b)`
	`4 {`
	`5 if (a > b)`
	`6 a = a - b;`
	`7 else`
	`8 b = b - a;`
	`9 }`
	`10`
	`11 return a;`
	`12 }`
		3

3C.	Provide a small code snippet and demonstrate how Decision Coverage and Condition Coverage might lead to different testing requirements. Discuss the strengths and limitations of each criterion.	**2**

4A.	Consider the given program P
	`int Min (int A, int B)`
	`{`
	`  int minVal;`
	`  minVal = A;`
	`  if(B<A)`
	`  {`
	`  minVal = B;`
	`  }`
	`  return(minVal);`
	`} // end Min`
	
	Create first order mutants using rules:
	• R1: Replace one variable with another in assignment statement.
	• R2: Replace relational operator '<' with '>'.
	• R3: Displaying error message if condition is evaluated as true.
	• R4: Assigning minVal = 0 instead of 'A'.
	Test Suite (TS):
	intMin(8, 12); Expected: 8
	intMin(7, 9); Expected: 7
	Evaluate the adequacy of the given test set in detecting variations introduced by first-order mutants for the provided problem. Utilize the first-order mutants created earlier to systematically test the existing test suite, and clearly present the output for each intermediate step. Represent the results in a tabular format if applicable. Additionally, modify or enhance the test set as needed based on the outcomes of the mutation testing.
		4

4B.	Demonstrate how "OLA: A ride hailing app" operates and show how a top-down integration method might be applied its basic functionalities.	**4**
4C.	Write a program to find max of two numbers and generate its equivalent first order mutant. Prove that mutant is equivalent.	**2**
5A.	What is the need of Linear Code Sequence and Jump testing? For the given program, identify the possible Linear Code Sequence and Jump.	**5**

	1. #include <iostream>
	2. using namespace std;
	3.
	4. int main() {
	5.
	6. int count = 0, sum = 0, input = 0;
	7. while(sum < 100){
	8. cin >> input;
	9. if(input == -1)
	10. break;
	11. sum = sum + input;
	12. count++;
	13. }
	14.
	15. cout << "Sum is: " << sum << endl;
	16. cout << "Numbers entered: " << count << endl;
	17. return 0;
	18. }	

5B.	Differentiate between stub and driver using an example.	**3**
5C.	Describe Regression Test Selection (RTS) Problem with the help of a diagram.	**2**

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