Nirma University
Institute of Technology
Semester End Examination (IR), December 2022
B. Tech. in Computer Science & Engineering, Semester-VII
2CSDE80 SOFTWARE TESTING AND QUALITY ASSURANCE

Roll / Exam No.		Supervisor's initial with date	

Time: 3 Hours   Max. Marks : 100

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Use section-wise separate answer book.
4. Draw neat sketches wherever necessary.

SECTION – I

Q-1. Do as directed: **[18]**

A
CO1, BL2
Differentiate between top-down and bottom-up integration testing. Write at least 6 proper differences with illustrations. **6**

B
CO1, BL6
Consider the following code snippet: **6**

```
begin
        float x, y, z = 0.0;
        int count = 0;
        do {
                if (x ≤ 0) {
                        if (y ≥ 0) {
                                z = y * z + 1;
                        }
                }
                else
                        z = 1/x;
        }
        y = x * y + z;
        count = count + 1;
        while (count > 0)
                output (z);
end
```

Perform the following:
   a) Create data flow graph for the program.
   b) By referring to the data flow graph, find a set of complete paths satisfying the all-defs selection criterion with respect to variable *count*.

OR

B
CO1, BL3
What is the purpose of mutation testing? A test engineer generates 70 mutants of a program P and 150 test cases to test the program P. After the first iteration of mutation testing, the tester finds 58 dead mutants and 4 equivalent mutants. Calculate the mutation score for this test suite. Is the test suite adequate for program P? Should the test engineer develop additional test cases? Justify your answer. **6**

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C
CO1,
BL4
Consider a program for the determination of the next date. Its input is a
triple of day, month, and year with the values in the range:

$$1 \le month \le 12$$
$$1 \le day \le 31$$
$$1900 \le year \le 2025$$

The possible outputs are "Next date" and "Invalid date". Identify the
equivalence class test cases for output and input domains for this prob-
lem. Also, design robust test cases considering boundary value analysis.
6

Q-2. Do as directed: **[16]**

A
CO2,
BL1
Discuss five views of software quality. Discuss the role of the Ishikawa dia-
gram in accessing the quality of a product.
6

OR

A
CO2,
BL1
Discuss in detail the different types of robustness tests used in system
testing.
6

B
CO2,
BL6
Consider the following code snippet:
10

```
int a, b, c, side[10];
String type;
a = side[0];
b = side[1];
c = side[2];
if(a > 0 && b > 0 && c > 0) {
        if (a < b + c && b < a + c && c < a + b) {
                if (a == b) {
                        if (b == c)    {
                                type = "equilateral";
                        else
                                type = "isosceles";
                        else if (a == c)
                                type = "isosceles";
                        else if (b == c)
                                type = "isosceles";
                        else
                        type = "scalene";
                else
                type = "not triangle";
        else
                type = "not triangle";
end if
```

Perform the following:
  a) Draw a control flow graph (CFG) for the mentioned program.
  b) From the CFG, identify a set of entry–exit paths to satisfy the com-
     plete statement coverage criterion.
  c) From the CFG, identify a set of entry–exit paths to satisfy the com-
     plete branch coverage criterion.

Q-3. Do as directed: **[16]**

A
CO3,
BL2
What is the objective of the test case design effectiveness metric? Which
metric is used for the same? Discuss the metric by taking a suitable ex-
ample.
8

B
CO2,
BL5
A hire-purchases scheme has adopted the following criterion for its customers. The customers will get the credit facility if they satisfy any of the following conditions: **8**

   i. The customer must hold the present job for more than 5 years and reside in the same place at least for 3 years. In this case, the customer will get credit upto rupees three thousand.

   ii. The monthly salary of the customer must exceed rupees two thousand and must hold the present job for more than 5 years. In this case credit will be given upto rupees four thousand.

   iii. The monthly salary must exceed rupees two thousand and reside at the same place at least for 3 years. In this case credit will be given upto rupees four thousand.

   iv. In the case, the customer's monthly salary exceeds rupees two thousand, holds the present job for more than 5 years and also reside in the same place at least for the 3 years, the credit facility will be upto rupees five thousand.

   v. The credit facility is rejected for all other customers.

Prepare a decision table for this hire purchase scheme. Show all the steps required for the creation of decision table.

SECTION – II

Q-4. Do as directed: **[18]**

A
CO4,
BL3
Justify the statement that software testability and fault tolerant are opposites to each other, and attaining both at the same time for the same piece of software is not feasible. When do you want high testability and when don't you during the life cycle of a critical software system? Justify your answer. **6**

B
CO4,
BL3
Discuss the advantages and disadvantages of late test automation, that is, for the first release of a product. **6**

OR

B
CO4,
BL3
Consider the system S which has three input parameters X, Y, and Z. Assume that set D, a set of input test data values, has been selected for each of the input variables such that $D(X) = \{True, False\}$, $D(Y) = \{0, 5\}$, and $D(Z) = \{P, Q, R\}$. Using the orthogonal array method, generate pairwise test cases for this system. **6**

C
CO4,
BL4
Assume you are working on a software project "Intrusion detection system (IDS) software". It is a monitoring system that detects suspicious activities and generates alerts when they are detected to take appropriate actions to remediate the threat. Answer the following questions: **6**

   i. List the quality attributes most important to your project.

   ii. Why are the selected acceptance criteria the most critical ones for your system?

Q-5. Do as directed: **[16]**

A
CO2,
BL1
Discuss how acceptance testing is performed in extreme programming. **6**

OR

A
CO2,
BL2
Differentiate between defect count and rework cost. How they are helpful in measuring the quality of software? **6**

B
CO3,
BL5

SME is implementing a Customer Relations Management (CRM) application. The Web Info (WI) application, an existing application, will be required to send information to the CRM each evening by retrieving all Requests for Information (RFI) submitted that day and currently maintained in the RFI logical file within the WI application. The following information is sent on this daily feed: requestor ID; requestor's first, middle, and last name; requestor's organization; requestor's address (street address, city, state, and Zip Code); date of request; requested items; and quantities for requested items. The CRM application will validate and process the daily feed into a new Potential Customer logical file. Separate reports by state will be generated each morning by the CRM application and delivered to state sales coordinators. The printout will contain all of the information on the Potential Customer logical file as well as a total number of requests for information, which is calculated at the time the report is produced. The state code and state name, retrieved from a code table, will also be printed on each report. Each state sales coordinator will have the ability to retrieve via screen all customer information maintained in the Potential Customer logical file by entering the requestor ID and action key; hardcoded error messages will be returned if the requestor ID is not found. The state coordinator can update the requested items and/or quantities using the requestor ID and a preassigned function key; hard-coded error messages may be returned if the newly assigned requested item is not contained in the Inventory logical file maintained by the Inventory application, or a hard-coded confirmation message will occur.

10

All of these data are of average complexity. The value of the processing complexity adjustment (PCA) factor is 50. Based on the data provided, compute the following:
  a) Mention all the external inputs, external outputs, external inquiries, internal logical files, and external interface files.
  b) Compute function points for the system.
  c) Estimate the total number of test cases based on function points.

The weighting factors required are provided as follows:

Simple	Average	Complex
3	4	6
4	5	7
3	4	6
7	10	15
5	7	10

Q-6. Do as directed: **[16]**

A
CO4,
BL2

Differentiate between coverage metric and traceability metric with help of suitable examples. **8**

B
CO4,
BL1

Elaborate on ISO 9126 quality characteristics and subcharacteristics. Establish and show relationship between them. **8**

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