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Master of Computer Application (MCA)

MCAC-203: Software Engineering

Unique Paper Code: 223401203

Semester: II

August 2022

Year of admission: 2021

Time: 3 Hours **Max. Marks: 70**

Instructions for the Students:

Parts of a question should be answered together.

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1. a. Differentiate between verification and validation. Which types of testing address the verification, and which types address the validation? (2+1+1)

b. Consider a software project with the following information domain characteristic for calculating function point metric. (6)

Number of external inputs (I) = 30
Number of external outputs (O) = 60
Number of external inquiries (E) = 23
Number of files (F) = 08
Number of external interfaces (N) = 02

Given that the complexity weighting factors for I, O, E, F and N are 4, 5, 4, 10 and 7, respectively. It is also given that, out of fourteen value adjustment factors that influence the development effort,

- four factors are not applicable,
- four factors have a value of 3, and
- remaining factors has a value of 4.

What will be the computed value of the function point metric?

2. a. Give the purpose of regression testing. What are the two main activities involved in regression testing? (2+3)

b. The availability of complex software is 90% having a Mean Time Between Failure (MTBF) of 300 days. Due to the critical nature of its usage, the organization deploying the software further enhanced it to obtain an availability of 95%. As a result, the Mean Time To Repair (MTTR) increased by ten days. What is the MTBF of the enhanced software? (5)

3 a. What is the purpose of DFD? Construct level-0, level-1 and level-2 DFDs for an Online Railway Reservation system. (1+6)

b. In context of the following statement on coupling, which of the following statements (i-iii) is/are correct? Justify your Answer. (3)

"Coupling is a measure of the strength of the interconnections between software modules."

(i) Common coupling occurs when one module controls the flow of another module by passing information on what to do.
(ii) In data coupling, the complete data structure is passed from one module to another through parameters.
(iii) Stamp coupling occurs when modules share a composite data structure and use only part of it.

4 a. Classify the following as functional /non-functional requirements for a banking system: (2)
(i) Verifying bank balance
(ii) Withdrawing money from the bank
(iii) Completion of transactions in less than one second.
(iv) Extending the system by providing more tellers for the customers.

b. The following program is to be tested for statement coverage: (3)

```
begin
  if (a == b) {S1; exit;}
  else if (c == d) {S2;]
       else {S3; exit;}
  S4;
end
```

The test cases T1, T2, T3 and T4 given below are expressed in terms of the properties satisfied by variables a, b, c, and d. The exact value of a, b, c, and d is not given.

T1: a, b, c and d are all equal
T2: a, b, c and d are all distinct
T3: a = b and c != d
T4: a != b and c = d

Determine the test suites to ensures coverage of statements S1, S2, S3 and S4?

c. Define risk. How will you define and categorize the risk? What are the various risks involved from the initialization of the software development to product delivery? Also explain how you will manage those risks in various phases? (1+2+2)

5 a. What is Cyclomatic Complexity? How is it computed? Calculate Cyclomatic Complexity for the program to find the smallest of three numbers. (1+2+4)

b. Illustrate in detail about (1+1+1)
(i) XP programming
(ii) Scrum
(iii) Data dictionary

6 a. List the features of LOC and FP-based estimation models. Compare the two models and list the advantages of one over the other. (2+2)

b. A software project involves the execution of 5 tasks, T1, T2, T3, T4 and T5, of duration of 10, 15, 18, 30 and 40 days, respectively. T2 and T4 can start only after T1 completes. T3 can start after T2 completes. T5 can start only after both T3 and T4 are complete. What is the slack time of the task T3 in days? (6)

7 a. What is modularity? State its importance for cohesion. (2+3)

b. Assume that the size of an intermediate type software product has been estimated to be 50000 lines of source code. Calculate the effort, and scheduled time for development by considering the developer having high experience (0.82) and a very low experience in programming (1.14). Assume that the other factors are nominal. (5)