Master of Computer Application (MCA)

MCAC-203: Software Engineering

Time: 3 Hours **Unique Paper Code: 223401203 (ER)**

Semester: II **Max. Marks: 70**

Parts of a question should be answered together.

1. a. What are the major causes of software crisis and how software engineering overcome the software crisis? (4)

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) = 20, 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. The availability of complex software is 80% having a Mean Time Between Failure (MTBF) of 200 days. Due to the critical nature of its usage, the organization deploying the software further enhanced it to obtain an availability of 90%. As a result, the Mean Time To Repair (MTTR) increased by ten days. What is the MTBF of the enhanced software? (7)

b. Which of the following statements is/are FALSE with respect to software testing? (3)

S1. White box tests are based on specifications; better at telling whether program meets specification, better at finding the errors of omission.

S2. Black-box tests are based on code; better for finding crashes, out of bound errors, file not closed errors.

S3. Alpha testing is conducted at developer's site by a team of highly skilled testers for software that is developed as a product to be used by many customers.

3. a. What is Prototyping Model? What are the shortcomings in it? What are the SDLC models which overcome these shortcomings? (6)

3. The following program is to be tested for statement coverage: (4)

```
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?

4. a. 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? (5)

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)

5. a. Explain COCOMO model with an example.

b. What is Cyclomatic Complexity? How is it computed? Calculate Cyclomatic Complexity for the program to find the Largest of three numbers. (6)

6 a. Differentiate between Cohesion and Coupling. Also explain two different types of coupling and cohesion with a suitable example for each. (9)

b. The Computer Services Division of a University wants to design a software solution to automate its Complaints Management System. The system should be allowed to record all the complaints from the users/departments of the University and provide services on priority basis. It should also produce reports of daily listing of complaints (attended and unattended), pending, etc. Assumptions can be made, wherever necessary. To accomplish the above-mentioned tasks, perform the following: (6) (9)

(i) Develop SRS for this system.
(ii) Draw the context level DFD, 1st level and 2nd level DFD