MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

CS-701

SOFTWARE ENGINEERING

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1. Answer *all* questions. $10 \times 1 = 10$

(i) One way to improve readability in coding is to

(A) avoid goto statements
(B) name variables and functions according to their use
(C) modularize the program
(D) none of these

(ii) The type of failure that occurs for all input values while invoking a function of the system is

(A) transient failure (B) permanent failure
(C) recoverable failure (D) unrecoverable failure

(iii) According to COCOMO number of cost drivers is

(A) 10 (B) 15 (C) 20 (D) 14

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(iv) The bet type of cohesion is

(A) coincidental (B) logical
(C) informational (D) functional

(v) A physical DFD specifies

(A) what processes will be used
(B) who generates data and who processes it
(C) what each person in an organisation does
(D) none of these

(vi) Function point describes

(A) the SRS document
(B) the test plans
(C) the functional decomposition
(D) the size of a software product directly from its specification

(vii) Efforts are measured in terms of

(A) Person-months (B) Persons
(C) Rupees (D) Months

(viii) Which form of software development model is most suited to a system where all the requirements are known at the start of a project and remain stable throughout the project?

(A) Waterfall model
(B) Incremental model
(C) Evolutionary model
(D) Spiral model

(ix) Which is not a size measure for software?

(A) LOC
(B) Function count
(C) Cyclomatic complexity
(D) Halstead's program length

(x) The cyclomatic complexity of the following program fragment is:

```
int gcd (int x, int y) {
while (x! = y) {
if ( x > y ) then
x = x – y;
else y = y – x;
}
return x;
}
```

(A) 2 (B) 3 (C) 4 (D) 5

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. What are Cohesion and Coupling? Mention different kinds of cohesion. 2+3

3. What is Use Case diagram? Draw the Use Case diagram of Hospital Management System. 1+4

4. (a) Define software quality. 2+3

(b) It is estimated that there will be 70 errors in a software. During testing 25 errors have been experienced. Calculate the failure intensity with a given value of $\phi = 0.03$ using Jelenski Moranda model. What will be the failure intensity after experiencing 50 errors?

5. What are different levels of Testing and their goals? 5

6. The size of an organic type software product has been estimated to be 1,00,000 lines of source code. The average salary of software developers is Rs.10,000/- per month. Determine the effort required to develop software product, the nominal development time and the cost to develop the product. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) What is meant by a Stub? What is a Driver? 1+1

(b) With some suitable examples, explain statement coverage, branch coverage, and path coverage criteria. 2+2+2

(c) Design a white box test suite for the following piece of C code: 7

```
int binary_search (int num)
        {
                int min, max;
                min = 0;
                max = 100;
                while (min ! = max) {
                        if (arr[(min + max )/2] > num)
                                max = (min + max)/2;
                        else if(arr[(min + max)/2] < num)
                                min = (min + max)/2;
                        else return ((min + max)/2); }
                        return ( –1);
}
```

The suite should include Control Flow Graph, Independent Path, and Cyclomatic Complexity (using two different techniques).

8. (a) Write down three advantages of decision trees over decision table. 3+3+6+3
   (b) Mention two situations where decision tables work best.
   (c) A bank has decided to adopt the following policy on deposits:
   On deposit of Rs. 5,000/- and above and for three years or above the interest is 10%. On the same deposit for a period less than 3 years it is 8%. On deposits below Rs. 5,000 the interest is 6% regardless of the period of deposit.
   Develop a decision tree and a decision table for the above process. Also express the above policy using structured English.
   (d) Distinguish between physical DFD and logical DFD with example of each.

9. (a) Explain top-down and bottom-up design. 3+4+4+4
   (b) Distinguish between object oriented design and function oriented design with proper examples.
   (c) Explain the phase of Spiral model with advantages and disadvantages.
   (d) Explain the advantages and disadvantages of prototype model.

10. Draw a context diagram and top level DFD for the following system. Also provide relevant data dictionary. 3+9+3
   The admission committee determines whether or not a student is admitted to graduate school. The associated dean determines the financial aid.
   Students send applications to the graduate school. From other universities, the graduate school receives transcripts. Additionally, unrelated third parties provide letter of recommendation. The Graduate Management Admissions Council (GMAC) provides GMAT scores. Upon receipt of the above items, the graduate school prepares an application packet and enters the student's name in the pending application file. An acknowledgement letter is sent to the student. The graduate school sends the application packet to the admission committee. The admission committee reviews the student's credentials. In most cases the student's are accepted. The committee sends the applicant a letter explaining the result of review. A copy of the letter is also sent to the registrar who creates a student record in the registrar's system. The accepted student's file is sent to the associated dean for financial aid review. The associate dean keeps a list of available scholarships. Based on the review of the student's interests and the

scholarship criteria a financial aid award letter is prepared, which again is sent to the student. Also, the controller's office receives a copy so that the proper bill can eventually be sent to the student once he/she registers for classes. The associate dean then updates the pending application file, closing out the student's record. Each month, the graduate school prepares a summary of how many applications have been received, approved and rejected. This report is sent to the university's president.

11. Write short notes on any *three* of the following: 3×5
   (a) CASE tools
   (b) Function point method
   (c) Risk management
   (d) Software configuration management
   (e) Verification and validation.