Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-4/MCA-401/2012

2012

SOFTWARE ENGINEERING & TQM

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) Among the development phases of software life cycle, which phase typically consumes the maximum effort ?

      a) Requirements analysis and specification

      b) Design

      c) Coding

      d) Testing.

   ii) Functional independence results in

      a) error isolation b) scope of reuse

      c) understandability d) all of these.

iii) The reliability growth modeling can be used

a) to improve the reliability of a software product as errors are detected and repaired

b) to predict when a particular level of reliability is likely to be attained

c) to determine when to stop testing to attain a given reliability level

d) all of these.

iv) Which option is most preferable ?

a) High coupling, low cohesion

b) High cohesion, low coupling

c) High cohesion and coupling

d) Low cohesion and coupling.

v) Which diagram is not included in Unified Modelling Language (UML) ?

a) Function hierarchical diagram

b) Activity diagram

c) Sequence diagram

d) Use case diagram.

vi) Which standard is applicable to IT service industry ?

a) ISO 9001 b) ISO 9002

c) ISO 9003 d) ISO 20000.

vii) What is the formula for effort calculation by COCOMO for an organic project ?

a) $2{\cdot}4 \times (\text{KLOC})^{1{\cdot}05}$ b) $3{\cdot}6 \times (\text{KLOC})^{1{\cdot}20}$

c) $3{\cdot}0 \times (\text{KLOC})^{2{\cdot}5}$ d) $3{\cdot}0 \times (\text{KLOC})^{1{\cdot}12}$.

viii) Which of the following models requires the maximum involvement of user ?

a) V model b) Prototyping model

c) Spiral model d) Formal method model.

ix) Which of the following is not the metric for object oriented testing ?

a) Number of key classes

b) Fan-in (FIN)

c) Lack of cohesion (LCOM)

d) Public access to data members (PAD).

x) Which of the following is not a step of debugging ?

a) Defect analysis b) Testing

c) Defect resolution d) Defect identification.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Identify two important features of that a program must satisfy to be called as a structured program. State three important advantages of structured programming.

3. Draw the control flow graph for the following function named find-maximum. From the control flow graph, determine its cyclomatic complexity.

```
int find-maximum (int i,int j,int k)
{
int max;
if (i>j)then
  if (i>k)then max=i;
    else max=k;
else if (j>k) max=j;
    else max=k;
return (max);
}
```

4. Explain Capability Maturity Model (CMM) and its levels.

5. What is Software Maturity Index (SMI) ? A legacy system has 940 modules. The latest release required that 90 of these modules be changed. In addition, 40 new modules were added and 12 old modules were removed. Compute the Software Maturity Index for the system. 2 + 3

6. What is the difference between the load testing and stress testing ? What are driver and stub modules in the context of unit testing of a software product ? 3 + 2

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is software metric ? Find the estimated length and volume of the following *C* program :

```
Main()
{
int a,b,c,avg;
scanf("%d%d%d",&a,&b,&c);
avg=(a+b+c)/3;
printf("avg=%d",avg);
}
```

b) Compute the function point value for a project with the following information domain characteristics.

Number of user inputs	:	42
Number of user outputs	:	70
Number of user inquiries	:	22
Number of files	:	9
Number of external interfaces	:	3

Assume that all complexity adjustment values are complex.

c) What do you mean by crashing of a project ? Give an example. 5 + 6 + 4

8. a) What is cyclomatic complexity ? For the given code, calculate the cyclomatic complexity.

```
1.  cin>>a>>b>>c;
2.  if(a>10)
3.  {
4.  cout<<“Hello”;
5.  if(b<a)
6.  {
7.  cout<<“a”;
8.  if(c>a)
9.  {
10. cout<<“c”;
11. }
12. }
13. else
14. {
15. cout<<“b”;
16. }
17. }
18. cout<<“Hi”;
```

b) What are the software reliability specifications ?

c) There are 50 errors estimated to be present in a program. We have experience of 30 errors. Use Jelinski-Moranda Model to calculate failure intensity with a given value of $\phi = 0.03$. What will be the failure intensity after the experience of 40 errors ? 6 + 3 + 6

9. Differentiate between error and defect. What do you mean by Total Quality Management ? Explain features and requirements of ISO 9001 certification. What are six sigma qualities ? What is the meaning of estimation ?

2 + 3 + 7 + 2 + 1

10. a) What is process model ? Briefly describe.

    b) What are the differences between ISO 9000 standard and CMM ?

    c) The MTBF concept for software is open to criticism. Can you think of a few reasons why ?

    d) Quality and reliability are related concepts but are fundamentally different in a number of ways. Discuss them.

    e) What is software safety ? 3 + 3 + 3 + 3 + 3

11. a) What is V-Model of software testing ?

    b) What is the difference between equivalence class partitioning and boundary value analysis ?

    c) What is DRE (Defect Removal Efficiency) ?

    d) A software increment is delivered to end-users by a software team. The user uncovers 8 defects during the first month of use. Prior to delivery, the software team found 242 errors during formal technical reviews and all testing tasks. What is the overall DRE for the project ? 4 + 4 + 3 + 4

12. Write short notes on any *three* of the following : 3 × 5

a) UML

b) Orthogonal array testing

c) Function oriented design *vs* object oriented design

d) 40-20-40 rule in effort distribution

e) Prototyping

f) Halstead's software science.