

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), May 2019

B. Tech. in Computer Science & Engg.(CSE),

Semester VI

Roll No.....

CSE 604: Software Engineering

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
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Q.1A Attempt all questions (10 questions @ 1 mark)

10

- i. Software engineering is the application of
 - (a) Systematic approach of the development
 - (b) Quantifiable approach of the development
 - (c) Discipline approach of the development
 - (d) All of these
- ii. Software engineering approach is used to achieve:
 - (a) Better performance of hardware
 - (b) Error free software
 - (c) Reusable software
 - (d) Quality software product
- iii. Software consists of
 - (a) Set of instructions + operating system
 - (b) Programs + documentation + operating procedures
 - (c) Programs + hardware manuals
 - (d) Set of programs
- iv. If user participation is available, which model is to be chosen?
 - (a) Waterfall model
 - (b) Iterative enhancement model
 - (c) Spiral model
 - (d) RAD model
- v. SQA plan provides:
 - (a) A road map for instituting SQA
 - (b) A guideline for software development
 - (c) A description of software
 - (d) None of the above
- vi. Adaptive maintenance is related to
 - (a) Modification in software due to failure
 - (b) Modification in software due to demand of new functionalities
 - (c) Modification in software due to increase in complexity
 - (d) Modification in software to match changes in the ever-changing environment.
- vii. Temporal cohesion means
 - (a) Cohesion between temporary variables
 - (b) Cohesion between local variable
 - (c) Cohesion with respect to time
 - (d) Coincidental cohesion

- viii. The extent to which different modules are dependent upon each other is called
 (a) Coupling (b) Cohesion (c) Modularity (d) Stability
- ix. Testing of software with actual data and in the actual environment is called
 (a) Alpha testing (b) Beta testing (c) Regression testing (d) None of the above
- x. The coupling between different modules as a software is categorized as follows:
 I. Content coupling II. Common coupling III. Control coupling IV. Stamp coupling V. Data coupling
- Coupling between modules can be ranked in the order as least desirable to most desirable as follows:
 (a) I-II-III-IV-V (b) V-IV-III-II-I (c) I-III-V-II-IV (d) IV-II-V-III-I

- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- What is the difference between a Bug and a Defect?
 - What is software crisis? Was Y2K a software crisis?
 - Define agile view of process and define the principles to achieve agility.
 - Distinguish between reverse engineering and re-engineering.
- Q.3A Explain waterfall model in detail. What are the problems that are sometimes encountered when the waterfall model is applied? 05
- Q.3B Compare and contrast the Scrum approach to project management with conventional plan-based approaches. The comparisons should be based on the effectiveness of each approach for planning the allocation of people to projects, estimating the cost of projects, maintaining team cohesion, and managing changes in project team membership. 05
- Q.4A What is the difference between SRS document and design document? What are the contents we should contain in the SRS document and design document? 05
- Q.4B What do you mean by modularity in software development? Do we design software when we "write" a program? If a module has logical cohesion, what kind of coupling is this module likely to have with others? 05
- Q.5A What is Software Quality Assurance? How the Registration process of ISO 9000 certification is done? 05
- Q.5B Discuss the differences between black box and white box testing models. Discuss how these testing models may be used together to test a program schedule. 05
- Q.6A Consider the program for the determination of nature of roots of a quadratic equation. Its input is a triple of positive integers (say a,b,c) and values may be from interval [0,100]. The program output may have one of the following 05

words. [Not a quadratic equation; Real roots; Imaginary roots; Equal roots]

Identify the equivalence class test cases for output and input domains.

- Q.6B What is software maintenance? Describe various categories of maintenance. 05
Which category consumes maximum effort and why?

OR

- Q.6B Define the steps to analyze and design Object Oriented System. Consider the 05
process of ordering a pizza over the phone. Draw an activity diagram
representing each step of the process, from the moment you pick up the phone
to the point where you start eating the pizza. Do not represent any exceptions.
Include activities that others need to perform.

- Q.7A Consider a program for determining the Previous date. Its input is a triple of 05
day, month and year with the values in the range

$1 \leq \text{month} \leq 12$

$1 \leq \text{day} \leq 31$

$1900 \leq \text{year} \leq 2025$

The possible outputs would be Previous date or invalid input date. Design the
boundary value test cases.

- Q.7B Draw a flowchart describing the code inspection process. Identify the types of 05
defects that you would be able to detect during the following:

- Code inspection
- Code walkthrough

OR

- Q.7B Draw the structure chart for the following program: 05

```
main ()
{
    int x, y;
    x=0; y=0;
    a (); b ();
}
a ()
{
    x=x+y;
    y=y+5;
}
b ()
{ x=x+5; y=y+x;
  a ();
}
```

How would you modify this program to improve the modularity?

- Q.8A The department of public works for a large city has decided to develop a web- 10
based pothole tracking and repair system (PHTRS). A description follows:
Citizens can log onto a website and report the location and severity of potholes.
As potholes are reported they are logged within a "public works department
repair system" and are assigned an identifying number, stored by street
address, size (on scale of 1 to 10), location (middle, curb, etc.), district

(determined from street address), and repair priority (determined from the size of the pothole). Work order data are associated with each potholes and include potholes location and size, repair crew identifying number, number of people on crew, equipment assigned, hours applies to repair, hole status, (work in progress, repaired, temporary repair, not repaired), amount of filler material used, and cost of repair (computed from hours applied, number of people, material, and equipment used). Finally, a damage file is created to hold information about reported damage due to the potholes and includes the citizen's name, address, phone number, type of damage, dollar amount of damage. PHTRS is a web based system; all queries are to be made interactively.

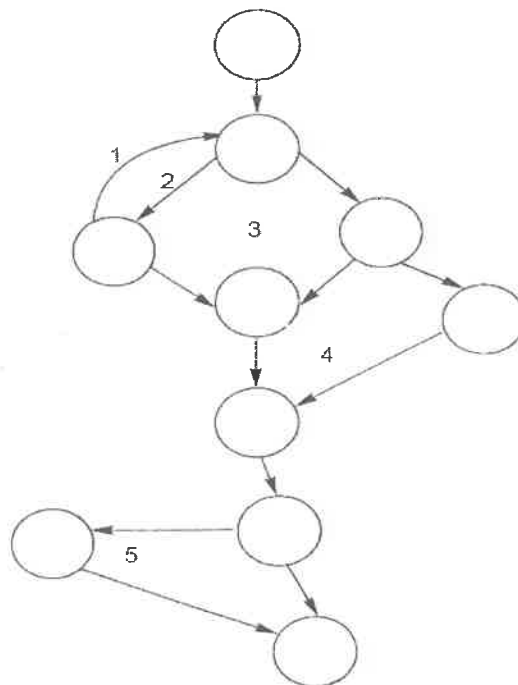
- i. Draw a context-level model (level 0 DFD) and level 1 DFD.
- ii. Draw a Use-case diagram for PHTRS system. You'll have to make a number of assumptions about the manner in which user interacts with this system.

Q.9A (i) Draw the Control Flow Graph (CFG) for the following program:

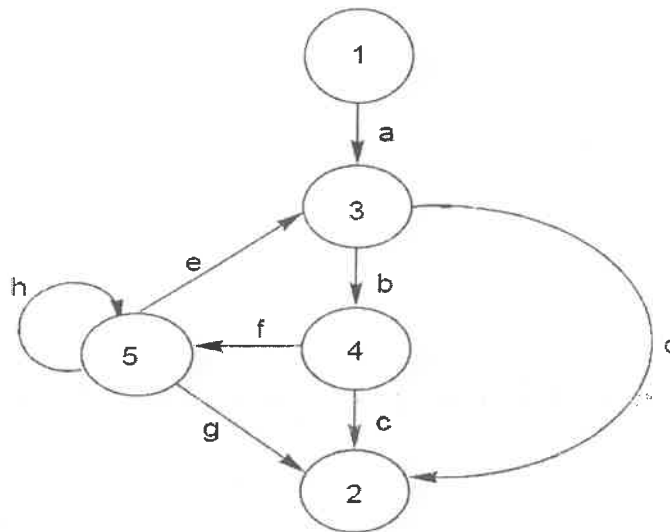
10

```
{
int x;
if(x>0)
result=x;
else result=1/x ;
printf("%d", result);
}
```

(ii) Consider following flow graph, calculate the Cyclomatic complexity by all methods.



(iii) Consider the flow graph shown in the Figure and draw the graph & connection matrices. Find out cyclomatic complexity.



Q.9B For a project of 100000 LOC embedded system, compare the efforts and time duration and find out the effort variation and time variation if 10

- Very highly capable with very little experience in the programming language being used (AEXP=.82, LEXP=1.14)
- Developers of low quality but a lot of experience with the programming language. (AEXP=1.29, LEXP=.95)

(Note: $a_i = 2.8$, $b_i = 1.20$, $c_i = 2.5$, $d_i = .32$)

OR

Q.9B A software has to be developed for automating the manual library of a University. The system should be stand alone in nature. It should be designed to provide functionality's as explained below: 10

Issue of Books:

- A student of any course should be able to get books issued.
- Books from General Section are issued to all but book bank books are issued only for their respective courses.
- A limitation is imposed on the number of books a student can issue.
- A maximum of 4 books from book bank and 3 books from general section is issued for 15 days only.
- The software takes the current system date as the date of issue and calculates date
- of return.
- A bar code detector is used to save the student as well as book information.
- The due date for return of the book is stamped on the book.

Return of Books:

- Any person can return the issued books.
- The student information is displayed using the bar code detector.

- The system displays the student details on whose name the books were issued as well as the date of issue and return of the book.
- The system operator verifies the duration for the issue.
- The information is saved and the corresponding updating take place in the database

Query Processing:

The system should be able to provide information like:

- Availability of a particular book.
- Availability of book of any particular author.
- Number of copies available of the desired book.

The system should also be able to generate reports regarding the details of the books available in the library at any given time. The corresponding printouts for each entry (issue/return) made in the system should be generated. Security provisions like the login authenticity should be provided. Each user should have a user id and a password. Record of the users of the system should be kept in the log file. Provision should be made for full backup of the system.

From the above problem description design the following:

- Use cases
- Use case diagram
- Sequence diagrams for login, return book.