AUTUMN END SEMESTER EXAMINATION-2023
5th Semester B.Tech

SOFTWARE ENGINEERING

IT-3003

(For 2022 (L.E), 2021 & Previous Admitted Batches)

Time: 3 Hours   Full Marks: 50

Answer any SIX questions.
Question paper consists of four SECTIONS i.e. A, B, C and D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable
and all parts of a question should be answered at one place only.

SECTION-A

1.   Answer the following questions.   [1 × 10]

(a)   What do you mean by 'Balancing a DFD'? Give a suitable example with a neat diagram.

(b)   Give at least one meaningful example along with a line of explanation for each of the following type of relations among classes:

    I.   Aggregation

    II.   Composition

(c)   What is Daily Scrum? What three questions are being asked during the daily scrum event?

(d)   "Maintenance is the most time taking phase of SDLC". Do you agree? Justify your answer.

(e)   "Debugging occurs as a consequence of successful testing" (True/False). List four debugging techniques.

(f) "Prototyping model is used for risky projects". (True/False). Justify your answer with suitable examples.

(g) List the properties of a good software design.

(h) "A software company can finish a project before the estimated time of completion by recruiting more staffs". Justify whether the statement is correct or not with suitable examples.

(i) Explain the type of maintenance required for migrating software to a different platform.

(j) What is meant by the term cohesion in the context of software design? Is it true that in a good design, the modules should have low cohesion? Why?

SECTION-B

2. (a) Suppose a travel agency needs to develop software for automating its book-keeping activities. The set of activities to be automated are rather simple and are at present being carried out manually. The travel agency has indicated that it is unsure about the type of user interface which would be suitable for its employees and its customers. [4]

Which Prescriptive Process Models would you like to propose and why? Explain your proposed model with a schematic diagram.

(b) Differentiate between software reverse engineering and software re-engineering with suitable diagrams. [4]

3. (a) Briefly explain the extreme programming (XP) SDLC model with a schematic diagram. Identify the key principles that need to be practiced to the extreme in XP. What is a spike in XP? Why is it required? [4]

(b) List out and discuss the KPAs for different levels of SEI CMM. [4]

SECTION-C

4. (a) List out and explain five functional requirements and five non-functional requirements for online railway ticket booking system with providing proper justification for the specified non-functional requirement. What are the four types of non-functional requirements as per IEEE 830 specifications? [4]

(b) [4]
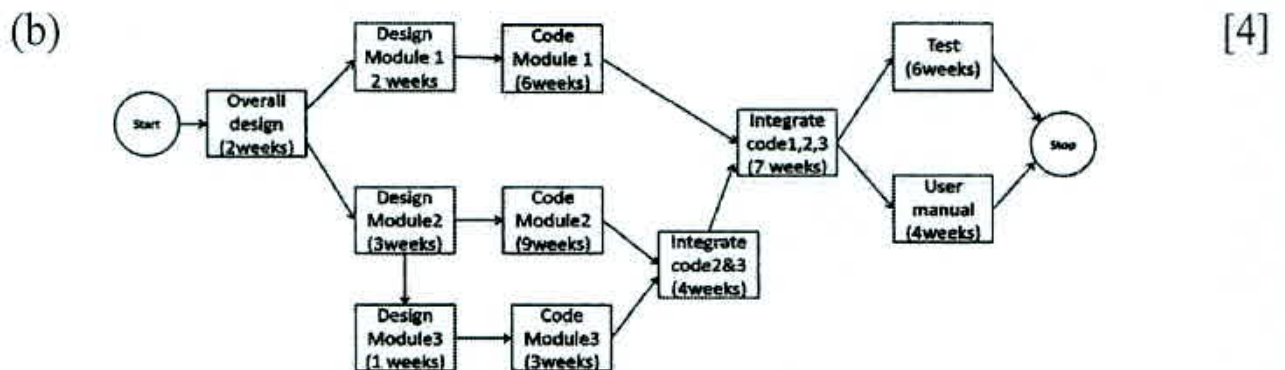
A) Use forward pass and backward pass to find slack time of each activity.
B) List out the critical activities.
C) Find out the critical path

5. (a) Differentiate between FP and LOC. [4]

Consider a project with following data:

- Number of external inputs with low complexity = 25
- Number of external inputs with high complexity = 20
- Number of external outputs with average complexity = 20
- Number of external inquiries with average complexity=15
- Number of internal logical files with high complexity = 5
- Number of internal logical files with low complexity = 2
- Number of external interface files with average complexity = 10

Assuming that, the DI = 40.
Calculate the UFP, TCF and FP.

(b) Explain Equivalence Class Partitioning method of testing. Generate the test cases for a program which finds the smallest among three numbers A, B, C. Given the range of A[1,10], B[1,20], C[1,50]. [4]

6. (a) Represent the decision making of a library automation system using decision tree and decision table, for the following functional requirement:- [4]

Issue_Book: Book name and ID card is submitted at the counter. First it is determined if the member has exceeded his quota, if quota exceeded, then the book issue is canceled. If not exceeded, then it is checked if it is a book, then issued for 5days, then it is checked if it is a journal, then issued for 2days and if it is a book, then it is checked if it is a reference book. Reference books cannot be issued. If it is a textbook, it is then checked if it is reserved, if reserved then cannot be issued, if not reserved then the book is issued to the member for one month, entry is made in the member account and issue slip is printed.

(b) If the COCOMO 81 model is followed, then what is the estimated effort for an organic system having 350 KLOC, a semi-detached system having 350 KLOC and an embedded system having 350 KLOC? Which one takes more effort and why? [4]

SECTION-D

7. (a) The manager of a supermarket wants us to develop automation software. The supermarket stocks a set of items. Customers pick up their desired items from the different counters in required quantities. The customers present these items to the sales clerk. The sales clerk enters the code number of these items along with the respective quantity/units. Perform structured analysis and structured design for developing this **Supermarket Automation Software (SAS).** [1+3]

- SAS should at the end of a sales transaction print the bill containing the serial number of the sales transaction, the name of the item, code number, quantity, unit price, and item price. The bill should indicate the total amount payable.

- SAS should maintain the inventory of the various items of the supermarket. The manager upon query should be able to see the inventory details. In order to support inventory management, the inventory of an item should be decreased whenever an item is sold. SAS should also support an option by which an employee can update the inventory when new supply arrives.

- SAS should support printing the sales statistics for every item the supermarket deals with for any particular day or any particular period. The sales statistics should indicate the quantity of an item sold, the price realized, and the profit.

- The manager of the supermarket should be able to change the price at which an item is sold as the prices of the different items vary on a day-to-day basis.

Answer the following:

1. Identify the functional requirements (along with input & outputs) from the problem description.
2. Draw the context diagram and the 1-Level & 2-Level DFD.

(b) Briefly explain the types of risk for a software project. After performing risk analysis of a dam, a group of experts estimated that 5% chance of flood could cause a damage of 10 Crore to a state whereas facilitating two more gates could decrease the chance of flood to 2% at the cost of 2lakhs. Is the risk mitigation step worth taking? [4]

8. (a) Draw a class diagram using the UML syntax to [4] represent the following: The book register of a library contains details of all books in the library. The various details for each book that are maintained includes its title, author, ISBN number, price, date of procurement, price, and date of last loan, person to whom loaned. A book can either be a reference or issue type book. The reference books are to be referred inside the library and cannot be loaned out, whereas issue books can be taken on loan by a member. A member may either be a gold member or an ordinary member. The member register contains the details of all members of the library. The details that are maintained for a member include member name, address, telephone number, date of joining library and books outstanding. Each library member can take on loan at most five issue books.

Take the necessary assumption after mentioning it in the answer sheet.

(b) int main() [4]

```c
int main()
{
int total_mark,tm;
printf("\nEnter total mark secured by a student: ");
scanf("%d",&total_mark);
tm=total_mark/10;
switch(tm)
{
case 9: printf("\nSecured grade is O");
break;
case 8: printf("\nSecured grade is E");
break;
case 7: printf("\nSecured grade is A");
break;
```

```c
case 6: printf("\nSecured grade is B");
break;
case 5: printf("\nSecured grade is C");
break;
case 4: printf("\nSecured grade is D");
break;
default: printf("FAIL");
}
return 0;
}
```

A) Draw the CFG for the given program.

B) Calculate the cyclomatic complexity.

C) List all the independent paths.

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