



QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – FAT

Course Code: CSE 1005

Course Title: Software Engineering

Set number: 2

Date of Exam: 18/05/2023 (An) (D2)

Duration: 90 min

Total Marks: 60

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

1. Suppose you have been asked to develop a Mobile app for “Foodie” Restaurant for ordering and serving tea, coffee, and snacks. Also, assume that the proposed name of the app is “Foodie-Online.”

Justify how agile process model is used to develop above software. [12 M]

2. For the mobile application specified in question 1

(a) Identify all possible use cases and actors and draw a use-case diagram for Foodie-Online. [6M]

(b) Draw the sequence diagram for Foodie-Online. [6 M]

3. a) Use Advanced COCOMO model to estimate the effort required to build software for a AI based website creating software that produces 14 screens, 12 reports, and will require approximately 70 software components. Assume average complexity and average developer/environment maturity. Use the application composition model with object points. Use below table for complexity weighting for object types. [8 M]

Object type	Complexity weight		
	Simple	Medium	Difficult
Screen	1	2	3
Report	2	5	8
3GL component			10

b) Discuss the relationship between effort and delivery time. [4 M]

4. Let's consider a very simple example of software project A which is to be completed in one year (12 months) and the total cost is \$300,000. The start date of the project is 01 October 2023, and the end date of the project is 30 September 2024. Assume that the budget is the same for each month. At a point of time analysis of the project is performed after 6 months (31 March 2024). The review performed on the project has shown that only 40% of the work

has been completed after 6 months and the actual cost is \$100,000. calculate Earned Value (EV), Schedule variance (SV), Schedule Performance Index (SPI), Cost Variance (CV), and Cost Performance Index (CPI). [12 M]

5. a) Discuss McCall's software Quality Factor Model in detail. [6 M]
 b) Discuss software re-engineering, explain in detail about various steps involved in re-engineering process. [6 M]

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1-2	1	3,5	3,5	1	12
Q2	3-4	2	3,5	3,5	1	12
Q3	5	3-4	7,10,11	7,10,11	1	12
Q4	5	4	7,10,11	7,10,11	1	12
Q4	6	5	7,10,11	7,10,11	1	12

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – FAT

Course Code: CSE1005

Course Title: Software Engg.

Set number: 5

Date of Exam: 18/05/2023 (FN)

Duration: 120 minutes

Total Marks: 60

(D)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. A. An online grocery home delivery service provider is planning to launch an application to bring revolution in the retail market. Describe the requirements with your assumptions and model them with (i) use-case diagram (ii) sequence diagram **(10M)**

B. Explain the importance of testing briefly during requirements gathering and how to carry it out? **(5M)**

Q2. A. A project size of 200 KLOC is to be developed. Software development team has average experience on similar type of projects. The project schedule is not very tight. Calculate the Effort, development time, average staff size, and productivity of the project. **(10M)**

B. In the project spectrum, THE PEOPLE have an important role to play to form teams. Describe about different types of team structure for successful execution of a project. **(5M)**

Q3. Describe about the basic principles of project scheduling. **(10M)**

Q4. An organization is entrusted with the execution of a project, which is comprised of 45 planned tasks. The estimated efforts required is 480 man-days. Currently, 5 tasks have been successfully completed. Compute the SPI, schedule variance, percent scheduled for completion, and percent complete using earned value analysis. **(10M)**

Task	Planned Effort	Actual Effort
1	10	11
2	12	12
3	11	15
4	10	10
5	10	10

Q5. Explain the software re-engineering model with suitable diagram.

(10M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	2	1	1	2	1	15
Q2	5	2	2	3	2	15
Q3	5	3	2	4	2	10
Q4	6	3	3	4	2	10
Q5	6	3	4	4	3	10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – FAT

Course Code: CSE1005

Set number: 4

Duration: 120 minutes

Course Title: Software Engineering

Date of Exam: 19/05/2023 (FN)
(E1)

Total Marks: 60M

Instructions:

1. Assume data wherever necessary.
 2. Any assumptions made should be clearly stated.
- Q1.** Consider 7 functions with their estimated lines of code. Average productivity based on historical data is 620 LOC/pm and labour rate is Rs. 8000 per month. Find the total estimates project cost and effort? F1 – 2340, F2 – 5380, F3 – 6800, F4 – 3350, F5 – 4950, F6 – 2140, F7 – 8400. (12M)
- Q2.** List and discuss in brief the McCall categorization of factors that affect software quality focusing on three important aspects of a software product with a neat sketch. Also give brief explanation about ISO 9126 Quality factors (12M)
- Q3.** Despite the challenges involved, software maintenance projects require a detailed plan that prioritizes the various maintenance types. Based on your experience, can you share with us, what are the issues and challenges faced while performing software maintenance? (12M)
- Q4.** Consider the process of ordering a pizza over the phone. Draw the use case diagram and also sketch the 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. Include activities that others need to perform. Add exception handling to the activity diagram you developed. Consider at least two exceptions. (Ex: Delivery person wrote down wrong address, deliver person brings wrong pizza). (12M)
- Q5.** You are interacting with the MIS department of a very large oil company with multiple departments. They have a complex regency system. Migrating the data from this legacy system is not an easy task and would take a considerable time. The oil company is very particular about processes, acceptance criteria and legal contracts. For the above scenario, suggest a life cycle model and specify the reasons? (12M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	5	5	2,3,4,8,9,10,11	1	1	12
Q2	6	6	4,9,10,11	1	1	12
Q3	6	6	4,9,10,11	1	1	12
Q4	2	2	1,2,3,4,5,9,10	1	1	12
Q5	1	1	1,2,3,9,10	1	1	12

QUESTION PAPER

Name of the Examination: FAST TRACK FALL 2023-2024 – FAT

Course Code: CSE1005

Course Title: Software Engineering

Set number: 1

Date of Exam: 18/8/23 (B1) (FN)

Duration: 120 minutes

Total Marks: 60

Q1. An airline or computer reservation system, serves as storage for flight-related information like schedules, fares and rules for each booking class, passenger name records (PNRs), e-tickets, etc. It's also involved in managing booking requests and ticket issuing.

- i) Analysis the case study and identify the actors, functions and draw usecase diagram. (6M)
ii) Sketch class diagram to represent the requirement model. (6M)

Q2. How can you measure software quality using quality metrics? Explain it in detail. (12M)

Q3. Suppose that a project was estimated to be 80,000 lines of code. Calculate effort & time for each of 3 modes of development (as given in the table below) using COCOMO model. (12M)

Software Product Type	A1	A2	B1	B2
Android version	3.4	1	2.5	1
Mac Version	4.0	1	2.5	1
Windows Version	4.6	1	2.5	1

Q4. How ISO 9126 factors of product quality management can be used at a strategic level to investigate quality characteristics? Explain all the dimension in details. (12M)

Q5 How Capability maturity model (CMM) framework analyse the approach and techniques followed by any organization to develop software products? Explain The 5 levels of CMM with diagram? (12M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	2	2	1, 2, 3, 4, 5, 9, 10	-	1, 2	12
Q2	4	4	4, 9, 10, 11	-	1	12
Q3	5	5	2, 3, 4, 8, 9, 10, 11	-	1	12
Q4	6	6	4, 9, 10, 11	-	1	12
Q5	6	6	4, 9, 10, 11	-	1	12

QUESTION PAPER

Name of the Examination: FAST TRACK FALL 2023-2024 – FAT

Course Code: CSE1005

Course Title: Software Engineering

Set number: 4

Date of Exam: 18/8/23 (B₂) (AN)

Duration: 120 minutes

Total Marks: 60

Q1. Develop the process of ordering a pizza over the phone. Draw the use case diagram and also sketch the activity diagram representing each step of the process, from the moment you pick up the phone to the point where you receive the pizza. **(12 Marks)**

Q2. Justify whether structural and data complexity have an impact on system complexity in the design model? Explain it in detail. **(12 Marks)**

Q3. Compute the Estimated Project Cost and Estimated Efforts for a project with the following information domain characteristics. **(12 Marks)**

No. of external inputs-30

No. of external outputs - 52

No. of external inquiries-22

No. of logical files-12

No. of external interface files-2

Assume complexity adjustment values for the above are average Assume that the organizational average productivity = 7.5 FP/pm. and the Labour rate = Rs.10000 per month.

Q4. You have been appointed as a project manager within an information system organization. Requirements are clearly documented by the customer. The application will be complex in nature. What Project team structure would you choose and why? **(12 Marks)**

Q5. Consider any software application that you have held in the last five years. Describe the Software Reengineering process to recommend changes to the software in an effort to make it more efficient. **(12 Marks)**

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	2	2	1, 2, 3, 4, 5, 9, 10	-	1	12
Q2	4	4	4, 9, 10, 11	-	1,2	12
Q3	5	5	2, 3, 4, 8, 9, 10, 11	-	1	12
Q4	5	5	4, 9, 10, 11	-	1	12
Q5	6	6	4, 9, 10, 11	-	1	12

QUESTION PAPER

Name of the Examination: FALL 2022-2023 - FAT

Course Code: CSE1005

Course Title: Software Engineering

Set number: 4

Date of Exam: 21.12.2022 AN

Duration: 1 hr 20 mins

Total Marks: 60

[C2]

Instructions:

1. Provide appropriate scenarios wherever necessary.
2. If explicit Scenarios provided in the questions, same should be addressed.

Q1. (i) With an example each illustrate how to provide functional independence and implement OO design concepts. **(10M)**

(ii) A digital diary mobile application is to be developed for deployment with few basic features to maintain events and alerts and integrating it with the contact information and the calendar. For each event and alert uploading of necessary information is to be provided for reference. As a next phase of deployment the application could be added with features to transfer the archived data regarding event and alerts periodically into cloud. With proper justification provide a suitable process model that could suffice the stated requirements.

(5M)

Q2. (i) A University management system is developed with 470 modules. Due to resizing of the institute the update of the software is to be done. After analysis it is found it is required to change 45 of these modules. In addition, 20 new modules to be added and 6 of old modules are to be removed. Compute the software maturity index for the system and comment on the same.

(7M)

(ii) A legacy inventory application was designed based on data-flow oriented approach with the factors S1 to S7 holding values of 24,4,4,22,5,80 and 0 respectively. Perform DSQI calculations and discuss on the quality achieved.

(8M)

Q3. (i) AXTN is a computer accessories sales and service company. They plan to computerise the process of recording sales made and open and close service requests. The option to view summary of sales and services also to be provided. The modules are split into sales, service and summary generation. Based on the complexity, the estimated lines of code for the modules are found to be

15000, 18000 and 12000 respectively. Based on the previous similar projects the average productivity achieved is 600 LOC/month and the approximate cost of labour \$5000 per month.

Calculate the estimated effort and total project cost. **(5M)**

No. of Views contain	Sources of data tales		
	Total <4 (< 2 servers <3 clients>	Total <8 (2-3 servers <3-5 clients>	Total 8 + (>3 servers > 5 clients>
<3	Simple	Simple	Medium
3-7	Simple	Medium	Difficult
>8	Medium	Difficult	Difficult

For Server

No. of section contain	Sources of data tales		
	Total <4 (< 2 servers <3 clients>	Total <8 (2-3 servers <3-5 clients>	Total 8 + (>3 servers > 5 clients>
0-1	Simple	Simple	Medium
2-3	Simple	Medium	Difficult
4+	Medium	Difficult	Difficult

For Reports

Object Type	Complexity Weight		
	Simple	Medium	Difficult
Screen	1	2	3
Report	2	5	8
3GL Components	-	-	10

Complexity Weights

Developer's experience & Capability	Productivity (PROD)
Very Low	4
Low	7
Nominal	13
High	25
Very High	50

Productivity Rate

(ii) For an e-commerce application, the scheduling is done using a network diagram. Given values for BCWS, BAC, BCWP and ACWP, how to calculate and interpret the progress indicators with respect to schedule and cost. **(10 M)**

Q4. (i) Identify any four software quality factors that are essential for a mobile application. Define them and map them with the corresponding quality attributes. **(8 M)**

(ii) Illustrate how business process re-engineering is performed. **(7 M)**

QUESTION PAPER

Name of the Examination: FAT (FALL 2022-2023)

Course Code: CSE1005

Course Title: Software Engineering

Set.No:-3

Date of Exam: 23-12-2022 FN (E1)

Duration: 120 min

Total Marks: 60

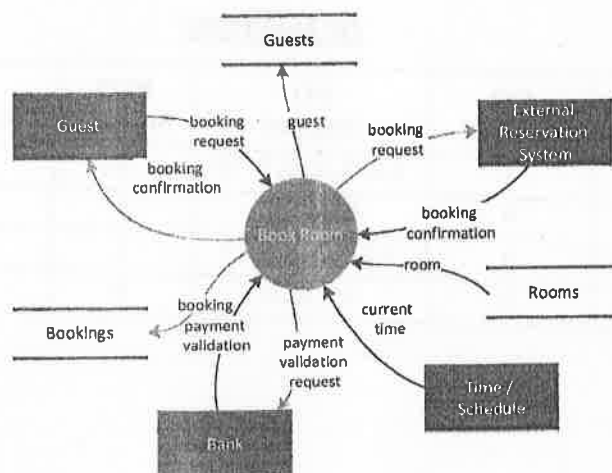
Instructions:

- Assume data wherever necessary.
- Any assumptions made should be clearly stated.
- No clarification during the examination; answer the questions as per your best understanding (carry marks).
- Answer all questions.

Q1. Suppose you have been asked to develop a smartphone app for "Swagat" restaurant of VIT-AP University for ordering and serving tea, coffee, and snacks. Also, assume that the proposed name of the app is "Swagat-Online."

- (a) Identify all possible use cases and actors and draw a use-case diagram for Swagat-Online. [5M]
- (b) Draw the sequence diagram for Swagat-Online. [5M]
- (c) Mention how did you reduce coupling and increased cohesion while designing the Swagat-Online by drawing the above two diagrams? [5M]

Q2. (a) Consider the following DFD as a requirement model for a hotel room booking module for a hotel management system. Using a function-based metric ($FP = \text{count total} \times [0.65 + 0.01 \times \sum (Fi)]$), compute the value of FP. Assume that all the weighting factor for all information domain value is average. Also, assume that the computed value adjustment factor identified (using a 5-point rating scale) is 56. [10M]



(b) Suppose you have been asked to refine/modify an app that you designed earlier (e.g., Swagat-Online). Assume that in your previous design there were six modules. Now you have added entirely a new module and completely deleted two modules while redesigning the app. In addition to that you have also modified two modules of the earlier versions of the design. Conclude on the stability of the app based on SMI value. [5M]

Q3. (a) Assume that in your design of an app there are 10 screens (at the user interface), 5 reports, and 20 3GL components likely to be required to build the application. Also assume that all screens and reports that you have designed are of medium complexity, and you can reuse 3 of the screens from an existing successful app. Assuming nominal developer's and environmental capability, following COCOMO-II estimate the effort required to develop the software. Following two tables might be helpful for the estimation. [10M]

Object type	Complexity weight		
	Simple	Medium	Difficult
Screen	1	2	3
Report	2	5	8
3GL component			10

Developer's experience/capability	Very low	Low	Nominal	High	Very high
Environment maturity/capability	Very low	Low	Nominal	High	Very high
PROD	4	7	13	25	50

(b) Earned Value Analysis (EVA) is a quantitative approach for project tracking, where Schedule Performance Index (SPI) and Schedule variance (SV) are computed to understand the current status of a project. With a suitable example, explain all the major three steps to compute SPI and SV. [5M]

Q4. (a) There are many quality factors of a software. Usability and reliability are two of such important factors. Explain briefly

- how reliability is related to availability,
- subfactors of usability

[10M]

(b) How CMMI is different from CMM?

[5M]

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	2	2	1,2, 3, 4, 5, 9, 10	2	1, 2	15
Q2	4	4	4,9,10,11	4	1	15
Q3	5	5	2,3,4,8,9,10, 11	5	1	15
Q4	6	6	4,9,10,11	6	1	15

QUESTION PAPER

Name of the Examination: FALL 2022-2023 - CAT/FAT

Course Code: CSE1005

Course Title: Software Engineering

Set number: 2

Date of Exam: 23-12-2022 AN

Duration: 120 mins

Total Marks: 60M

[E₂]

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

- Q1.** i) Consider that you have been asked to create a mobile app for the new VIT AP Canteen that will allow students and faculty to order and receive coffee, tea and other items online. Assume that "VITAP-Fresh" is the app's proposed name as well. Draw the class diagram and activity diagram for "VITAP-Fresh". (10M)
- ii) Describe the design quality attributes FURPS with real time example. (5M)
- Q2.** i) The proposed software system has 42 user inputs, 64 user outputs, 18 inquiries, 10 internal logical files, 12 external interface files. Various processing complexity factors are: 3, 2, 1, 4, 4, 5, 3, 3, 2, 3, 4, 5, 4, 5. Assume that weighting factors are average for user inputs, internal files, complex for inquiries, simple for outputs, external interfaces. Compute the function point value. If the effort the proposed system is 37 person-months then find the productivity of the system. (10M)
- ii) A legacy software system has 850 modules. The latest release requires that 80 of these modules to be changed. In addition, 60 new modules were added and 22 old modules were removed. Compute the software maturity Index for the system. (5M)
- Q3.** i) Use the COCOMO II model to estimate NOP, Estimated Effort and Estimated Cost to build software for reservation system that produces 28 screens, 34 reports, and will require approximately 137 software components.
- Assumptions:
- a) The system is component-based development so percentage of reuse is 35%.
 - b) Software has an average complexity weight as 13, 17 and 22 for screens, reports and components respectively.
 - c) Very high developer / environment maturity.
 - d) Past projects show burden labour rate of Rs. 3758 per month. (10M)
- ii) Assume you are a software project manager and you've been asked to compute earned value statistics such as SPI, SV, CPI, CV, percent scheduled for completion, percent complete for the \$1750000 scheduled for 18 months. At the end of the 6th month project is 20% complete with total expense of \$275000. (5M)

- Q4.** i) Describe the factors that should be focused for the quality of software. **(8M)**
- ii) Being an owner of a restaurant, you've purchased a billing software. You've never actually used the software, but you acquired it at an amazingly low price, with the warning that it might have to be completely rebuilt. How would you proceed and what model you will apply to rebuild? **(7M)**

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1,2	1,2	1,2	2	1,2	15
Q2	4	4	4, 5, 9, 10	2	1	15
Q3	5	5	4, 8, 9, 10, 11	2	1	15
Q4	6	6	4, 9, 10, 11	2	1	15



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QUESTION PAPER

Name of the Examination: Short Summer-1 (2022-23) - FAT

Course Code: CSE1005

Course Title: Software Engineering

Set number: 1

Date of Exam: 21/06/2023 (FN) (A1)

Duration: 120 min

Total Marks: 60

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.
3. No clarification during the examination; answer the questions as per your best understanding (carry marks).
4. Answer all questions.

Q1. (a) "An agile team is a nimble team able to appropriately respond (/quick adapt) to changes". What are the different reasons for these changes? **[5M]**

(b) Two popular models that follow agile framework are 'Scrum' and 'Extreme Programming (XP)'. What are the key differences between these two agile models? **[5M]**

Q2. (a) Suppose you are trying to build an app (smartphone application) to calculate income tax. For the simplicity, assume that income tax is calculated based on the following rules:

I. If the age of an employee is less than 40, then tax payable is as follows:

i. If annual income < 300000, no tax.

ii. If annual income 300001-500000, tax is 10% of total income.

iii. If annual income is more than 500000, tax is 20% of total income.

II. If the age of an employee is 40 or above, they will have 5% deduction of tax.

III. A woman employee is required to pay 5% less than men employee.

A) Draw the flow diagram for the tax calculation module of your app.

B) Construct the control-flow graph for it.

C) Compute the cyclomatic complexity based on McCabe's model.

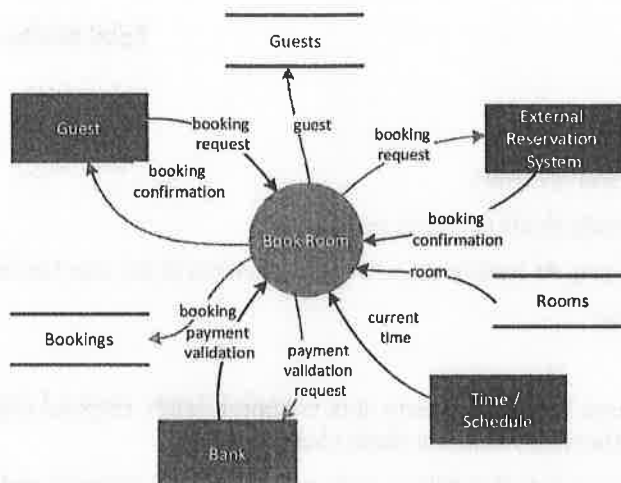
D) Conclude on the hardness of the program based on this calculation, with a proper justification. **[3+1+3+1=8M]**

(b) "For top-down integration, we usually require stubs but no drivers." – Comment on this sentence with justification and example. **[2M]**

Consider the following example scenario for answering Q3 and Q4:

Suppose you have been asked to develop a smartphone app for VIT-AP bus services. This might help the students, faculties, and non-teaching staffs to avail the bus services and information having provision for registration, payment, location-track and so on. Also, assume that the proposed name of the app is "B4V".

- Q3. (a) Identify all functional requirements and Draw level wise DFDs for 'B4V'. [6M]
 (b) Draw ERD for the same. [4M]
- Q4. Draw activity diagram and sequence diagram for "B4V". [5+5=10M]
- Q5. Consider the following DFD as a requirement model for a hotel room booking module for a hotel management system. Using a function-based metric ($FP = \text{count total} \times [0.65 + 0.01 \times \sum (Fi)]$), compute the value of FP. Assume that all the weighting factor for all information domain value is *average*. Also, assume that the computed value adjustment factor identified (using a 5-point rating scale) is 56. [10M]



- Q6. Assume that in your design of an app there are 10 screens (at the user interface), 5 reports, and 20 3GL components likely to be required to build the application. Also assume that all screens and reports that you have designed are of medium complexity, and you can reuse 3 of the screens from an existing successful app. Assuming nominal developer's and environmental capability, following COCOMO-II estimate the effort required to develop the software. Following two tables might be helpful for the estimation. [10M]

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	Simple	Medium	Difficult
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3GL component			10

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PROD	4	7	13	25	50

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,2,3,9,10	1, 2	1	10
Q2	3	3	1,2,4,5,9,10	3	1	10
Q3	2	2	1,2,3,4,5,9,10	2	1,2	10
Q4	2	2	1,2,3,9,10	2	1,2	10
Q5	4	4	4,9,10,11	4	1	10
Q6	5,6	5,6	2,3,4,8,9,10, 11	5,6	1	10