

Final Assessment Test – May 2024**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of the UGC Act, 1956)Course: **BCSE301L - Software Engineering**Class NBR(s): **0580/0583/0586/0591/0596/0599/****0605/0612/0616/0625/0645/0653/0657/0669/0677/** Slot: **C2+TC2****0704/0711/0717/0722/0726/0732/0738/5793**Time: **Three Hours**Max. Marks: **100**

- **KEEPING MOBILE PHONE/ELECTRONIC DEVICES EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

Answer any TEN Questions**(10 X 10 = 100 Marks)**

1. a) Suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems. Provide reasons for your answer by discussing both the factors that influenced your decision and the fundamental steps followed in developing the systems. [6]
- i) A space agency is developing a sophisticated software system for an imminent mission to Mars, which will manage spacecraft operations, gather scientific data, and execute vital tasks during the journey and on the Martian surface. Given the inherent complexities and uncertainties of space exploration, the project demands an adaptable and iterative software development approach
 - ii) A renowned research institute in biotechnology has initiated a pioneering project to develop a new drug for a rare genetic disorder. The project entails collaboration among scientists, researchers, and medical experts to conduct rigorous laboratory experiments, clinical trials, and regulatory assessments.
 - iii) The city government is embarking on a significant infrastructure project to construct a new transportation system, including highways, bridges, tunnels, and public transit facilities, to alleviate traffic congestion and enhance mobility in the metropolitan area. This initiative aims to support economic growth, improve public transportation services, and foster sustainable urban development to meet the needs of the expanding population.
- b) Answer the followings: [4]
- i) Since a focus on quality demands resources and time, is it possible to be agile and still maintain a quality focus? Justify.
 - ii) Do you agree or disagree with the following statement: "Since we deliver multiple increments to the customer, why should we be concerned about quality in the early increments – we can fix problems in later iterations". Explain your answer.

2. Consider the following table to find out the details of the activities to be carried out for developing a new drug to combat cancer.

Activity	Precedes	3-point Estimates (weeks)
A	-	2-4-6
B	-	1-3-5
C	A, B	3-5-7
D	C	2-4-6
E	B, D	1-2-3
F	A, C, D	3-6-9
G	E	2-5-8
H	G	4-7-10
I	H	2-4-6
J	H	1-2-3
K	F	3-5-7
L	F	1-3-5
M	I	4-6-8
N	J, L	2-4-6

The 3-point estimates shown in the above table represents the activity duration in the form of optimistic time, most likely time and pessimistic time respectively. Using the values given in the table, answer the followings:

- i) Draw the precedence network diagram.
 - ii) Identify the critical path.
 - iii) What is the project completion time?
 - iv) Prepare a Gantt Chart
 - v) If there is an option to delay one or more activity(s) without delaying the entire project, which activity(s) would you delay and why?
3. a) Describe the process of building a risk table. What is RE score? How do we calculate it? Explain its role for effective handing of risk. [5]
- b) An embedded project size of 500000 DSI is to be developed. Software development team has average experience on similar type of projects. The project schedule is very tight. The effort multipliers such as VIRT (1.15), STOR (1.06), CPLX (1.15), MODP (0.91) and TOOL (0.91) are rated as high and rest effort multipliers are nominal (1). Calculate the effort, development time, [5]

average staff size and productivity of the project. Consider the constant values as given below:

$$a = 2.8$$

$$b = 1.20$$

$$c = 2.5$$

$$d = 0.32$$

4. Consider the following system requirement specifications for an e-commerce platform.

The e-commerce platform shall provide a comprehensive shopping experience for users to browse, select, and purchase products from various categories. Users shall be able to create accounts using their email addresses and passwords. Upon registration, users shall receive a confirmation email to verify their accounts. The platform shall support multiple languages and currencies to cater to a diverse user base. Users shall have access to product reviews and ratings to make informed purchase decisions. The platform shall offer discounts and promotional offers to incentivize purchases. Users shall be able to track the status of their orders and receive notifications for order updates. The platform shall integrate with third-party payment gateways to facilitate secure transactions. Users shall have the option to return or exchange products within 30 days of purchase. The platform shall provide customer support via live chat and email to address user queries and concerns promptly.

- i) Prepare a detailed requirement specification document using the above scenario showing at least two functional and one non-functional requirement. (Present the sub-requirements as applicable)
- ii) Draw the context diagram and Level-1 DFD for the same
- iii) Validate the requirements by identifying ambiguity, inconsistency and incompleteness in it with proper justification for the same.

5. The proposed software system aims to revolutionize project management within the organization by providing a comprehensive platform for efficient collaboration and task management. This sophisticated system will cater to the diverse needs of various stakeholders, including Project Managers, Team Leaders, Developers, and Quality Assurance Engineers. Project Managers will wield overarching control, overseeing project lifecycles from inception to completion. Team Leaders will play a crucial role in task assignment and coordination, ensuring alignment with project objectives and timelines. Developers will utilize the system to streamline code review processes and maintain coding standards, fostering a culture of quality and efficiency. Quality Assurance Engineers will leverage the platform to conduct rigorous testing, ensuring the integrity and reliability of deliverables. With functionalities ranging

from project creation to resource management, the system will empower users to track progress, generate insightful reports, and conduct productive meetings. By facilitating seamless communication and collaboration, this software solution promises to enhance productivity, drive innovation, and propel the organization towards greater success.

- i) Draw a use case diagram using the above scenario showing requisite associations between different use cases and actors. [6]
 - ii) Use cases are one possible technique for specifying requirements that rests on describing the interactions between actors in the system. Are there situations in which use cases are impractical, even if it is clear what the interaction between the actors is? Explain and/or give an example. [4]
6. a) Identify the type of cohesion as well as coupling that exists in the following examples and provides possible reasons to support your claim. [6]
- i) **Online Banking Transaction Processing:** The *TransactionProcessor* class handles the entire transaction workflow. It validates user credentials, checks account balance, debits/credits accounts, logs transactions, and sends notifications. The logic within the class determines the execution flow based on different conditions.
 - ii) **Social Media Newsfeed Generation:** The *NewsfeedGenerator* class retrieves data from various sources (user posts, followed topics, friend activity). It then filters, sorts, and combines this data into a single newsfeed structure based on pre-defined algorithms.
 - iii) **Media Player Playback Controls:** A *MediaPlayer* class handles playback controls for audio or video files. This includes functionalities like play, pause, stop, seek (forward/backward), adjust volume, and mute.
- b) List three principles that should be applied when building any user interface. Through few examples discuss why response time variability can be an issue while designing an interface. [4]
7. a) The user selects a book from the catalog, enters their library card number, and the system checks if the book is available and the user has no outstanding fees. If all criteria are met, the book is borrowed, and the due date is displayed. Otherwise, the system displays an appropriate error message. Design a black-box test suite for *Borrow Book* functionality. Prepare suitable test cases to test *Borrow Book* function. [5]

b) Do you agree or disagree with the following statements: [5]

- i) Focusing solely on achieving high path coverage is the most effective way to guarantee high-quality software.
- ii) Higher cyclomatic complexity of code directly translates to a higher number of test cases needed for thorough coverage.

Justify your answer with the help of suitable example for each.

8. Imagine you're a Quality Assurance (QA) tester for a new e-commerce clothing store website called "Trendy Threads." This website allows users to browse clothing items, add them to a shopping cart, checkout using various payment methods, and track their orders.

How would you design and execute a comprehensive test plan to ensure the functionality, usability, and security of the Trendy Threads website?

9. a) Software Development is a team work and carried out in a collaborative manner. The team member's work together to achieve the common target of delivering the product to the client on time and within budget. Consider a scenario where two programmers Programmer1 & Programmer2 are allotted one module Module1 to work upon and different versions of the code for Module1 are to be maintained. Discuss different strategies for version handling for the above scenario. [5]

b) Consider a modern software development project aimed at building a social media platform for a start-up company. The project is well underway, with several features already implemented and tested. However, during the testing phase, the project team receives feedback from beta testers indicating that the messaging feature lacks certain functionalities and needs improvement to meet user expectations. [5]

Based on the above scenario, describe the change control process incorporating the steps involved and the importance of effective change management. Provide guidance on how the change control process can help address the issues raised by the beta testers and ensure the successful delivery of the social media platform.

10. Consider library's online book borrowing system, which allows users to search for books, check their availability, and place borrowing requests. Can the functionalities related to the system given be correct and still neither reliable nor exhibit good quality? Explain using suitable example. Discuss how the principles of CMMI can be applied to address these quality challenges faced by the library's online book borrowing system.

11. Differentiate between test case and test suite. Discuss the significance of an optimal test suite. Explain the necessary points to be considered while preparing an optimal test suite through appropriate example.
12. Your company is developing a new e-commerce platform for selling athletic wear. The platform will allow users to browse products by category, view detailed product information, add items to a shopping cart, and complete secure online purchases. Users will also be able to create accounts for managing their order history and preferences.
Develop a WBS for this e-commerce platform project showcasing at least five major components. Identify key milestones and deliverables mapped for each major component of the WBS.

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