ASSIGNMENT

Part 1

***1.Explain what software engineering is and discuss its importance in the technology industry***

Definition: **Software Engineering** is the systematically application of engineering principles, methods and tools to develop and maintain high quality software systems.

**Importance of Software Engineering**

1.Ensures Systems are of quality, reliable and are according to the user requirements

2.Aids prevent cost errors by following appropriate structured methodologies

3.Aids to promote innovation by allowing systematic exploration and implementation of new ideas while managing risks effectively.

4.Aids protect systems against vulnerabilities and safeguard data by following engineering principles

***2. Identify and describe at least three key milestones in the evolution of software engineering.***

1. The establishment of software engineering as a discipline in the 1960 -This period marked a fundamental shift from ad-hoc and informal approaches to a more structured and systematic approach to software development
2. The advent of structured programming in the 1970s – this period introduced new techniques and principles that transformed how software are was written leading to more reliable ,maintainable and understandable code.

The rise of agile methodologies in the 2000s-this period introduced a new approach to software development that prioritized flexibility ,collaboration and iterative progress over the traditional, linear models.

***3. List and briefly explain the phases of the Software Development Life Cycle***.

1. Requirements-Gathering and documenting user needs and systems requirements
2. Design-Creating high-level and detailed designs of the software architecture and user interface
3. Implementation-writing code and building the software according to the design specifications
4. Testing -Conducting various test to ensure the software meets quality standards and functional requirements.
5. Deployment-Releasing the software to users or customers
6. Maintenance-providing ongoing support, update and enhancements to software after deployments.

***4. Compare and contrast the Waterfall and Agile methodologies. Provide examples***

***of scenarios where each would be appropriate.***

1. ***Waterfall methodologies*** -is a linear methodology that limits a team’s ability to diverge from the project plan at different stages in the SDLC***.***

***Scenarios***: It suits projects that require a high volume of documentation and have a repeatable, predictable processes.

1. ***Agile Methodologies-***is an iterative and incremental approach that focuses on flexibility , collaboration , responding to change and customer feedback.

***Scenarios :*** It suitable for projects that have flexible processes and incorporate customer feedback throughout the process.

***5. Describe the roles and responsibilities of a Software Developer, a Quality Assurance Engineer, and a Project Manager in a software engineering team.***

* *Roles and responsibilities of a Software Developer*

1. Writing the code and developing the entire software product
2. Sending updates to the project manager
3. Identify, troubleshoot and resolve bugs or performance issues in the software
4. Improve code efficiency , performance and scalability
5. Ensure the documentation is kept up-to-date with changes to the software.

* *Roles and responsibilities of a QA engineer*
  1. Collaborate with stakeholders to understand and clarify software requirements
  2. Create development starndars and procedures for the programmers to follow
  3. Confirm that the software meets the requirements before deployment.
  4. Analyse the product to identify bugs and suggest changes to make them more efficient
  5. Develop and execute automation scripts using open-source tools.
* *Roles and responsibilities of a Project Manager*
  1. Discuss the project and its requirements with clients and software developers
  2. Assemble and lead the software development team
  3. Create the blueprint for the project
  4. Supervise each stage of the software development project
  5. Set the budget and ensure the project adheres to it as closely as possible

***6. Discuss the importance of Integrated Development Environments (IDEs) and Version Control Systems (VCS) in the software development process. Give examples of each***

* 1. *Importance of IDEs*

1. They provide a central interface for common developer tools, making the software development process more efficient.
2. Have built-in debuggers that allow developers to set breakpoints, step through code, and inspect variables making it easier to diagnose and fix issues.
3. Provides access to documentation, tutorials and code samples to aid developers learn and use new technologies more effectively.

*Example of IDEs*

* Visual Studio Code
  1. *Importance of VCS*

1. Aids in improved collaboration
2. Aids in enhanced traceability and accountability
3. Aids in efficient Maintenance
4. Allows developers to maintain code integrity and consistency throughout the project.
5. Serves as a backup for source code, protecting against data loss.

*Example of VCS*

* GIT

***7.What are some common challenges faced by software engineers? Provide strategies to overcome these challenges.***

*Challenges*

1. Changing Requirements
2. Tight deadlines
3. Technical debt

*How to overcome these challenges*

1. Effective communication
2. Use of Agile Methodologies
3. Prioritization of tasks
4. Regular reassessments of projects goals and timelines

***8. Explain the different types of testing (unit, integration, system, and acceptance) and their importance in software quality assurance.***

1. Unit testing-Test Individual component
2. Integration testing-Test integrated component
3. System Testing-Test the entire system
4. Acceptance Test-Test the final system

*Importance of testing in software quality assurance*

* Helps identify defects and failures early in the development process when they are less expensive to fix.
* Ensures that software adheres to standards, regulations and compliance to user requirements
* Testing provides vital feedback that can be used to continuously improve software quality, user experience, security ,performance and other product attributes.

***Part 2***

**1.Define prompt engineering and discuss its importance in interacting with AI models**

**Definition**: *Prompt Engineering* -is the practice off designing and refining questions or instructions to elicit specific responses from AI models.

*Importance of Prompt Engineering*

* It makes it easy for users to obtain relevant results in the first prompt
* It enhance the user AI interaction so the AI understands the users intention even with minimal input.
* Helps minimize misinterpretation issues
* Helps enhance efficiency

**2. Provide an example of a vague prompt and then improve it by making it clear, specific, and concise. Explain why the improved prompt is more effective.**

**Vague Prompt-**Tell me about cars

**Improved Prompt-**Write about the features of G-Wagon Brabus G63

The improved prompt is more clear ,specific and concise hence the AI module will give specific features about the specific car unlike the vague prompt where the AI module will give the details about cars in general.