Marking Scheme

Q.1) a) What is software engineering? What are the characteristics of software? What **[6]** are objectives of software engineering?

Definition of Software Engineering - 2marks

[Software engineering is] the establishment and use of sound engineering principles in order to obtain economically software that is reliable and works efficiently on real machines. (1mark)

IEEE Definition Software Engineering: (1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. (2) The study of approaches as in (1). (1marks)

Characteristics of Software (2 marks)

- Software is developed or engineered; it is not manufactured.
- Software Does not wear out.
- Although industry is moving towards component based construction,

   most s/w continues to be custom built.

Objective of Software Engineering (2 marks)

b) Explain generic process model of software development. **[6]**
Generic Process model
- Figure of generic process model (2 marks)
- Phases of it (4 marks)

c) Provide two examples of software projects that would be amenable to **[4]** incremental model.

- ***An operating system.*** The various parts of the O/S could be developed as the customer wants them. For example, the customer might want to specify the GUI first, and try it out before providing further specifications for the remaining parts of the O/S. The GUI could then be developed; once the user approved, some of the most important functions of the Hardware Abstraction Layer portion could be added. The process could continue until the entire system is complete, with customers getting continuing updates to test and approve.
- ***An internet browser application.*** The base application could be developed and distributed, followed by any of a number of plug-ins to increase functionality. The plug-ins might include javascript interpretation, XML parsing, and so on. Most of the browsers available could follow this model.
- ***Satellite Telemetry and Control software.*** There are a number of parts to a system of this nature, all of which can be developed (basically) independently, and then later integrated. The customer can (again) take delivery of parts of the system, such as the telemetry decommutator, command encoder, and telemetry history archive.

OR

Q.2) a) Define software. Compare software and hardware based on their failure curves. **[6]**

Definition of Software (2marks)
Comparison of software and hardware based on their failure curves (Graph 2 marks, Explanation 2 marks)

b) Explain spiral model. Give advantages and disadvantages of it. **[6]**
Diagram of spiral model (1 marks)
Explanation of phases in model (3 marks)
Advantages and Disadvantages (2 marks)

c) Compare Prototyping with RAD model. **[4]**
In prototyping model:
- The developed prototype is primarily used to gain insights into the solution
- Choose between alternatives
- Elicit customer feedback.

The developed prototype:
- Usually thrown away.

In contrast:
- In RAD the developed prototype evolves into deliverable software.

RAD leads to faster development compared to traditional models:
- However, the quality and reliability would possibly be poorer.

Q.3) a) Discuss XP values and XP process. **[6]**
XP values (2 marks)
  Communication
  Simplicity
  Feedback
  Courage
XP process (4 marks)
Planning
Designing
Coding
Testing

b) Agile Means No Planning/ Documentation. Justify your answer **[4]**
▸ Actually there are multiple levels of planning
  ◦ Daily planning
  ◦ Bi-weekly Sprint planning
  ◦ Release Planning every 3 – 4 months
▸ Agile does, in fact, produce documentation, even though it differs from that of Waterfall.
  ◦ Increased collaboration throughout Agile development projects provides all stakeholders with a better understanding of the end product as it is being created, thus reducing the need for some design documentation.
    • For example, rather than create a single, lengthy document listing all project requirements, project managers might

compile a collection of user stories that can be actively updated and maintained using software, prioritized on the fly, and used to provide real-time visibility into development progress.

c) Explain meaning of the following in one sentence: [4]
  a. Test driven development: Test-driven development, or TDD, is a rapid cycle of testing, coding, and refactoring which cranks up the feedback on the execution of your code. Every few minutes TDD verifies that the code does what you think it should do.
  b. Refactoring: Refactoring is the process of code improvement where code is reorganized and rewritten to make it more efficient, easier to understand, etc.
  c. Pair programming: Two programmers work together at one machine **Driver** enters code, while **navigator** critiques it. Periodically switch roles.
  d. Sprint: Unit of work in one increment.

OR

Q.4) a) List down agile manifesto. Discuss the principles help to achieve the agility. [6]
  Agile Manifesto (2 marks)
  Customer Collaboration
  Responding to change
  Working Software
  Individual and Interactions

b) Agile Process model follows iterative and incremental development. Justify [4]
  Iterative Development: Software is developed and delivered to customer and based on the feedback again developed in cycles or release and sprints. Say in Release 1 software is developed in 5 sprints and delivered to customer. Now customer wants some changes, then development team plan for 2nd release which can be completed in some sprints and so on.
  Incremental Development: Software is development in parts or increments. In each increment a portion of the complete requirement is delivered.

c) Describe pitfalls of agile process model.
  Pitfalls of agile process model [4]
  1. It can be difficult to keep the interest of customers who are involved in the process.
  2. Team members may be unsuited to the intense involvement that characterizes agile methods.
  3. Prioritizing changes can be difficult where there are multiple stakeholders.
  4. Maintaining simplicity requires extra work.
  5. Contracts may be a problem as with other approaches to iterative development.