Sample questions and answers

Question 1 (20 Marks)

(a) Explain the following

i. Agile method (1 Mark)- a software development method based on principles and manifestomanifesto
ii. Software process (1 Mark) software development activities, their relationships and interdependences, order of execution.
iii. Vertical prototype (1 Mark) – A system view software prototype built quickly to gain understanding of system to be built
iv. Software Engineering (1 Mark) - ways of engineering software based on set of principles that aim to deliver on-time, high quality, operational software that contains functions and features that meet the needs of all stakeholders

(b) Explain any four of the following software process attributes with respect to rational unified process

i. Understandability (2 Marks) – how easy it is for developers to understand process – RUP based on fundamental problem solving approach and use of widely know UML makes it understandable
ii. Standardization (2 Marks) – whether its based on generic standards in different parts of organization – organization standards may mirror RUP or not
iii. measurability (2 Marks) - whether measurement metrics for various activities are specified – RUP doesn't specify metrics
iv. Acceptability (2 Marks) – How acceptable process is to developers – RUP relatively acceptable process because its wide usage and support for UML
v. Reliability (2 Marks) – ability of process to trap errors to allow development to continue without resulting in product errors - RUP support iteration which allow development to continue to the step that corrects errors

(c) Explain four framework activities common to all software projects (4 Marks)
Planning and following plan to develop artifact

Deployment

Modeling and design –develop simplified representations of system integrated in designs

Construction –

Communication –

(d) What is a social technical system? (1 Mark) one or more computer systems and people who understand the system

(e) Describe following layers of a social technical system with reference to a mobile money transfer system

i. Society (1 Mark) regulations and laws governing use of system
ii. organization (1 Mark) organization strategy and policies
iii. Business (1 Mark) process followed by business to carry out its activities like hiring an employee

Question 2 (15 Marks)

a. Describe how you carry out the following using XP method to develop a software system.

i. Software process (3 Marks)

1. eliminate complexity,
2. incremental and iteration,
3. prioritize peoples skills over process
4. use agile process like agile unified process
5. Have courage to stick to XP practices

ii. Programming (3 Marks)

1. Divide programmers in pairs
2. When on programmer is writing program the other is thinking what to do next
3. Rotate pairs to work on different parts of system
4. Change the pairs so different members working in different combinations
5. Implement user stories for each increment

iii. Testing (2 Marks)

1. Prepare the tests before coding
2. Any part developed should be integrated and integration testing carried out
3. Testing results determine what activity will be carried out, test driven development

b. Write user stories for Banking system (7 Marks)

Question 3 (15 Marks)

a. i. Describe four differences between software processes models. (4 Marks)

1. specification of roles
2. rigor and detail of activities
3. Degree of quality assurance
4. Risk analysis
5. Level of planning
6. Specification Flow of activities and tasks

ii. Assess the spiral process model according to differences in a i. on levels low moderate and high and give one reason each (4 Marks)

1. Low – few lows specified
2. High requires high level of details and process activities and order has to be followed
3. High – at each step quality assurance required before proceeding to the next
4. High level analysis required at each level

5. High requires detailed planning
6. High – a spiral has to be followed

b. i. Explain two advantages and two disadvantages of incremental process model (5 Marks)

Advantages

1. Reduced Cost of change
2. Better learning because of feedback from customer and understanding system from parts built by developers
3. Working system available in short time
4. Phased delivery doesn't require a lot of capital

Disadvantages

1. Iteration rigid as increments don't interact with each other
2. Problems with database unless its developed in early increment
3. Progress not visible
4. Problem may arise with architecture because requirements are not obtained upfront

ii. How does advantages and disadvantages of incremental model in b i. relate to those of waterfall process model (2 Marks)

Many Advantages of incremental model are disadvantages of waterfall

Many Disadvantages of incremental model are advantages of waterfall

Question 4 (15 Marks)

You have been hired as a consultant software engineer to design an online book system that sells stationary, publications: books, journals and magazines using rational unified process. You are the team leader with 10 experienced software engineers and a sufficient budget.

a. Carry out inception and draw use case diagrams (5 Marks)

Technically, economically feasible

Proceed

use case diagram attached page

b. Carry out Elaboration and draw class diagram (6 Marks)

Architecture – describe repository and client/server

Goals geographical reach

Make plan for development

Attached class diagram

c. Construction design by adding operations in class diagram in 4 b. (4 Marks)

Inventory

- Operations add, delete item
- Decrease or increase items
- Reorder
- Change Price

Salesorder

- Change discount
- ChangeQuantity
- ChangeUnitprice

Purchase order

- Change orderduedate
- Cancelorder
- DisplayCanceldate
- DisplayOrderduedate

Question 5 (15 Marks)

a. Explain the following characteristics of ill structured problems (wicked problems)

i. Complexity (1 Mark) – the system consists of parts that interact in non linear ways, when one problem is solved other problems are created. E.g. bug introduced during maintenance

ii. Solution emergence (2 Marks) – Its not possible to understand problem without partial developing a solution

iii. Stopping criteria (2 Marks) When to stop performing a process activity doesn't have a measurable criteria – When enough testing or planning has been done

iv. Type of solution (1 Mark) – There is no true or false solution just a good or bad solution

b. Explain three ways agile methods deal with any three characteristics in 5(b) (9 Marks)

<u>Complexity</u> –
Divide system into increments,
Design process to deal with change,
Eliminate complexity
If story is complex divide it into two or more stories

<u>Solution emergence</u>
Perform just enough of an activity, in future if improvement is required refactor or improve the work product
Increment allows solution emergence
Leverage team skills to deal with emerging problems
Continuous learning by developers and customers

Stopping criteria
Focusing on producing software prevents other overdoing activities

Iteration allows us to go back to an activity for correction or improvement
Stop when necessary software is developed
Focus on satisfying current analysis and needs and be ready to deal with future changes

Type of solution
Develop a solution that you improve with experience
Involve customer to ensure that customer needs are met
Eliminating complexity enables understanding of problem and solution being developed.
Refactor to improve solution
Avoid perfection – there is no way of knowing the best solution