

Software Development Methodologies, QA, and Testing Tools

This area is definition-heavy and easy to score if revised.

SDLC

SDLC = Software Development Life Cycle.

Phases:

1. Requirement analysis
2. Design
3. Implementation/coding
4. Testing
5. Deployment
6. Maintenance

Waterfall model

Sequential model.

Best when:

- requirements are fixed,
- project is simple,
- changes are unlikely.

Disadvantage:

- difficult to handle changing requirements.

Agile

Iterative and incremental development.

Features:

- frequent delivery,
- customer collaboration,
- embraces change,
- continuous feedback.

Scrum

Agile framework.

Terms:

- Sprint: fixed development cycle.
- Product backlog: prioritized feature list.
- Sprint backlog: work selected for sprint.
- Scrum master: facilitates process.
- Product owner: represents business/customer.
- Daily standup: short status meeting.

Kanban

Visual workflow board.

Columns:

To Do -> In Progress -> Testing -> Done

Key idea: limit Work In Progress.

DevOps

DevOps combines development and operations.

Goals:

- faster delivery,
- automation,
- CI/CD,
- monitoring,
- reliability.

CI/CD

CI = Continuous Integration.

CD = Continuous Delivery/Deployment.

Pipeline steps:

code -> build -> test -> package -> deploy

Verification vs Validation

Verification	Validation
Are we building the product right?	Are we building the right product?
Checks process/design/spec	Checks user need
Usually before/during development	Usually after implementation

Testing levels

Type	Meaning
Unit testing	tests individual function/module
Integration testing	tests module interaction
System testing	tests complete system
UAT	user acceptance testing

Testing types

Black-box testing

Tester does not know internal code. Tests input/output behavior.

White-box testing

Tester knows internal code and logic.

Grey-box testing

Partial knowledge of internals.

Smoke testing

Basic check to verify build is stable enough for further testing.

Sanity testing

Quick check after small change/fix.

Regression testing

Ensures new changes did not break old functionality.

Performance testing

Checks speed, scalability, and stability under load.

Load testing

Checks behavior under expected load.

Stress testing

Checks behavior beyond expected limits.

Bug life cycle

Typical states:

New -> Assigned -> Open -> Fixed -> Retest -> Verified -> Closed

Other states:

- Reopened
- Deferred
- Duplicate
- Rejected

Severity vs Priority

Severity: impact of defect.

Priority: urgency of fixing defect.

Example:

- App crash on payment: high severity, high priority.
- Typo on rarely visited page: low severity, low priority.
- Company logo wrong on home page: low severity, high priority.

Test case

A test case includes:

- test case ID,
- objective,
- preconditions,
- steps,
- test data,
- expected result,
- actual result,

- status.

Common testing tools

Tool	Use
Selenium	web UI automation
JUnit	Java unit testing
TestNG	Java testing framework
PyTest	Python testing
Postman	API testing
JMeter	performance/load testing
Jira	bug/project tracking
Jenkins	CI/CD automation
Git	version control
GitHub/GitLab	code hosting + CI

Common MCQ traps

- Smoke testing happens before detailed testing.
- Regression testing is after changes.
- Validation is user-need oriented.
- Severity is technical impact, priority is business urgency.
- Agile welcomes changing requirements.
- Waterfall is sequential.