"Investing in Africa's future"

COLLEGE OF ENGINEERING AND APPLIED SCIENCES (CEAS)

NCSE 300: SOFTWARE TESTING AND QUALITY ASSURANCE

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2025

LECTURER: Prof. Yogesh Awasthi

DURATION: 3 HOURS

INSTRUCTIONS

Answer the question as per the instructions given in the sections

Start **each** question on a new page on your answer sheet.

The marks allocated to **each** question are shown at the end of the section.

Section A (20 Marks)

Answer all questions in this section

Question 1- Multiple Choice Questions

Choose the correct or the best alternative in the following: (2×10 = 20 marks)

i. Which testing type is primarily concerned with validating system performance under stress?
a) Regression Testing
b) Performance Testing
c) Unit Testing
d) Black-box Testing

ii. The Requirement Traceability Matrix (RTM) is used to:
a) Identify bugs
b) Link requirements to test cases
c) Optimize cost
d) Plan automation tools

iii. Mutation testing is mainly used to:
a) Evaluate test case effectiveness
b) Reduce development time
c) Document software defects
d) Eliminate redundant code

iv. Which metric belongs to **process quality**?
a) Defect density
b) Test coverage
c) Productivity of testing team
d) Customer satisfaction

v. "Customer focus, employee involvement, process improvement" are principles of:
a) Six Sigma
b) Agile Testing
c) TQM
d) Waterfall

vi. Which tool is widely used for performance testing?
a) Selenium
b) JUnit
c) JMeter
d) Bugzilla

vii. Ishikawa's Fishbone Diagram is also known as:
a) Pareto Chart
b) Cause-and-Effect Diagram
c) Histogram
d) Run Chart

viii. The PDCA cycle in TQM stands for:
a) Plan-Do-Check-Act
b) Plan-Design-Control-Apply
c) Process-Design-Check-Assure
d) Product-Develop-Control-Apply

ix. The Regression test case is not a ----------?
a) Tests that focus on the software components, which have been modified.
b) Low-level components are combined into clusters, which perform a specific software sub-function.
c) Additional tests that emphasize software functions, which are likely to be affected by the change.
d) A representative sample of tests, which will exercise all software functions.

x. In which of the following testing level, the main focus is on customer usage?
a) Validation Testing
b) Alpha Testing
c) Both Alpha and Beta Testing
d) Beta Testing

Section B (40 Marks)

Question 2.

Answer any Five questions from Section B. **(8×5=40 marks)**

a. Explain the purpose of Software Quality Assurance (SQA) in the development life cycle. How does it differ from Quality Control?
b. Discuss the different stages of a software testing workbench and its role in test management.
c. Consider a program which computes the square root of an input integer between 0 and 6000. Determine the equivalence class test cases. Also determine the test cases using boundary value analysis

d. Explain the importance of test strategy and test planning in ensuring software reliability.
e. What are the key differences between Continual and Continuous Improvement cycles in quality management?
f. Describe the concept of Six Sigma in software engineering. What are its key principles and objectives?
g. What skills are essential for an effective software tester? Illustrate with examples.
h. Explain mutation testing with the given code snippet. How does it help in improving test suite quality?

Section C (40 Marks)

Question 3.

Answer any two questions from Section C. **(20×2=40 marks)**

a. Discuss Total Quality Management (TQM) and its relevance in software development and testing. How do principles such as customer focus, employee involvement, and leadership commitment contribute to achieving quality?
b. Draw the Flow control graph for the program given below and find the Cyclomatic Complexity.

```
(a) sum of all positive numbers(a, num of entries, sum)
(b) sum = 0
(c) init = 1
(d) while(init <= num of entries)
(e) if a[init] > 0
(f) sum = sum + a[init]
endif
(g) init = init + 1
endwhile
(h) end sum of all positive numbers
```

c. Explain why a high-quality software process should lead to high-quality software products? Discuss possible problems with this system of quality management.

d. How do different stakeholders perceive and evaluate quality in software development and testing? Can you elaborate on the perspectives of customers, suppliers, employees, management, society, and government regarding their expectations and assessments of software quality?

END OF EXAMINATION