

**FACULTY OF SCIENCES**  
**DEPARTMENT OF COMPUTER SCIENCE**  
**2024 1 EXAMINATION**

COURSE CODE: CIT308

COURSE TITLE: FORMAL METHODS AND SOFTWARE DEVELOPMENT

COURSE CREDIT: 3 UNITS

TIME ALLOWED: 2 HOURS

INSTRUCTION: ANSWER QUESTION 1 AND ANY OTHER THREE QUESTIONS

Q1.

- (a) Discuss 4 qualities of an acceptable user interface? **4 marks**
- (b) Draw a data flow diagram for online banking system **5 marks**
- (c) Construct a truth table for the formula  $(\neg(p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow \neg r$  **12 marks**
- (d) List 8 reasons why formal methods are useful? **4 marks**

Q2

- (a) What are formal methods? **2 marks**
- (b) In formal logic, under what circumstances is the following true?  $(x < 3 \wedge x > 5) \Rightarrow x = x + 17$  **6 marks**
- (c) Differentiate with examples, the two types of test flow? **7 marks**

Q3.

- (a) Discuss the system, integration and user acceptance testing? **6 marks**
- (b) Mention 3 types of software development models.

**3 marks**

(c) List any 6 terminologies used to describe sets relationship?

**3 marks**

(d) Outline 6 stages of the SDLC?

**3 marks**

**Q4**

(a) Using a table, discuss the relationship between the integrity level (low, medium and high) and the formal method stages?

**12 marks**

(b) Mention 3 criteria that must be met before any 'formal system' can be considered a logic?

**3 marks**

**Q5**

(a) Given three sets  $X = \{3, 4, 7, 9\}$ ;  $Y = \{4, 2, 3\}$  and  $Z = \{10, 8, 6\}$ ,

- (i) describe and provide the elements of:  $(X \cap Y \cap Z) \cup (X \cup Z)$ .
- (ii) Shade off the set:  $(X \cap Y \cap Z) \cup (X \cup Z)$ .

**12 marks**

(b) A good software must be operational, transitional and maintainable. Clearly distinguish between these terms?

**3 marks**

**Q6.**

(a) Itemise 6 reasons, why software quality is advantageous to an organization.

**3 marks**

(b) Enumerate and describe 4 of the software development phases

**4 marks**

(c) Why is it important to have precision in the specification of software?

**3 marks**

(d) Enumerate possible reasons why formal methods have not become mainstream software development techniques?