



**KENYATTA UNIVERSITY**  
**EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN COMPUTER**  
**SCIENCE**

**SCO 809: SOFTWARE ENGINEERING TECHNIQUES**

**2<sup>ND</sup> SEMESTER 2023/2024**

**TIME: 3 HOURS**

**INSTRUCTIONS: Answer Question ONE and ANY Other two Questions.**

**QUESTION ONE**

- a) Using the paper "IT Crisisology: The New Discipline for Managing Software Development in Crisis" by Zykov (2019), :
- i. Explain the THREE pillars of IT Crisisology **(9 marks)**
  - ii. What approaches do the authors believe would reduce software crisis **(6 marks)**
- b) You are developing control software for an ERP system for serving five universities. Software upgrades will be delivered remotely rather than at service visits, so that any security vulnerabilities can be identified quickly. This in turn means that you will have to provide updates, to deal with both security and safety issues for the next 5 years.

Required:

- i. Assuming you intend to improve the timeliness of change request processing during the maintenance phase of the above system, the resulting goal will specify a purpose (improve), a process (change request processing), a viewpoint (project manager), and a quality issue (timeliness). Generate two important questions and the possible metrics that can answer those questions **(5 marks)**
  - ii. Explain metrics that can help in assessing the quality of code in (a) above **(5 marks)**
- c) Consider a web browsing client, such as Firefox, Chrome, Safari, or Explorer. Suggest some good ways to measure the quality of such a software system, from an end-user's perspective **(5 marks)**

**QUESTION TWO**

- a) The result of the application of the Goal Question Metric (GQM) approach is the specification of a measurement system targeting a particular set of issues and a set of rules for the interpretation of the measurement data. Illustrate the three levels of this model **(10 marks)**
- b) Describe the kind of information needed to understand and control a software development project, from manager perspective **(5 marks)**

### QUESTION THREE

During a software testing exercise, the data indicated in table 1 was collected.

Table 1: Software test data

| Testing Metric                                           | Data collected during test |
|----------------------------------------------------------|----------------------------|
| No. of requirements                                      | 5                          |
| The average number of test cases written per requirement | 40                         |
| Total no. of Test cases written                          | 200                        |
| Total no. of Test cases executed                         | 164                        |
| No. of Test cases passed                                 | 100                        |
| No. of Test cases failed                                 | 60                         |
| No. of Test cases blocked                                | 4                          |
| No. of Test cases unexecuted                             | 36                         |
| Total no. of defects identified                          | 20                         |
| Defects accepted as valid by the dev team                | 15                         |
| Defects deferred for future releases                     | 5                          |
| Defects fixed.                                           | 12                         |

Use the data provided in table 1 to calculate the following

**(15 marks)**

- i. Percentage test cases executed.
- ii. Test Case Effectiveness
- iii. Failed Test Cases Percentage
- iv. Blocked Test Cases Percentage
- v. Fixed Defects Percentage

#### **QUESTION FOUR**

Case Study :

JazzNights is a famous Jazz festival, held in Zurich every year. Since its first edition in 1986, it has gone through several major changes regarding its structure, length and location, but the tickets have always been sold in a traditional way: through two events agencies. The organizers decided to completely modernize the tickets selling system and created the following concept. From this year on, the tickets will be sold in three distinct ways: traditionally, i.e. by the two events agencies, in electronic format directly on the festival website, and through SBB. All parties will have access to the same unique tickets database of the new system, to avoid double selling. A partnership with the SBB railway company needs to be set up, such that SBB can sell combi-tickets including both the festival admission fee and the train ride to the festival venue at reduced price, from anywhere in Switzerland. This way, more music fans would have easier and cheaper access to JazzNights. Moreover, the system will have to be extended to support not only German, but also English, French and Italian. Since tickets will also be sold online, SecurePayment Inc. will be contracted to provide and ensure the security of the online payment service. The JazzNights event manager will take care and negotiate all these details with the involved parties. Additionally, upon arrival at the festival venue, each participant has to self-check in at a touch screen terminal, which scans the barcodes on his/her ticket and issues a bracelet with an electronic chip. This can be used to load money, such that whenever (s)he wants to purchase snacks or beverages, (s)he does not have to use cash any more, thus reducing waiting times. This measure was initiated by the program manager and will be deployed by WristSolutions Inc. Lastly, according to the cantonal laws, the way the payment transactions are performed has to be audited by an external company at the end of the festival, since this is a public event, where the municipality of Zurich is also involved - allowing free use of the public space.

- a. Identify and name at least FIVE (5) stakeholders of the JazzNights new tickets selling system.  
(5 Marks)
- b. Draw a context diagram of the new JazzNights tickets selling system. Make sure you label the actors, the relationships between them as well as their relationships to the system. Note: Do not forget to document your assumptions, if you make any.  
(10 Marks)

#### **QUESTION FIVE**

- a) Assume that the size of an organic type software product has been estimated to be 32,000 lines of source code. Assume that the average salary of software engineers be ksh 150,000/- per month. Determine the effort required to develop the software product and the nominal development time. Finally, compute the cost.  
(5 marks)
- b) From the paper "predicting the cost estimation of software projects using case-based reasoning" by tair (2013), explain the author's arguments for adoption of case-based reasoning in software costing  
(10 marks)