



## FACULTY OF SCIENCE

### ACADEMY OF COMPUTER SCIENCE & SOFTWARE ENGINEERING

<b>MODULE</b>	<b>IFM3B10</b> ADVANCED SOFTWARE ENGINEERING
<b>CAMPUS</b>	APK
<b>EXAM SPECIAL SSA</b>	JANUARY 2014

<b>DATE</b>	13 JANUARY 2014	<b>SESSION</b>	09H00 – 12H00
<b>DURATION</b>	3 HOURS	<b>MARKS</b>	150
<b>ASSESSOR</b>	MR T.D. MPHUTHI		
<b>INTERNAL MODERATOR</b>	DR W.S. LEUNG		
<b>EXTERNAL MODERATOR</b>	DR L. FUTCHER		

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#### PLEASE TAKE CAREFUL NOTE OF THE FOLLOWING:

1. All questions are compulsory.
  2. Answer all questions that refer to the CASE STUDY, in relation to the CASE STUDY provided.
  3. Answer all questions that do not refer to the CASE STUDY, in relation to the material covered during the course of the module.
  4. Answer all questions in the ANSWER BOOK(S) supplied.
  5. Note the mark allocation for each question: if a question is worth 2 marks, give at least two points' worth of answers.
  6. Do NOT write in pencil. **Anything in pencil WILL NOT BE MARKED.**
  7. Write neatly and legibly. We cannot mark what we cannot read.
  8. **NO** calculators may be used.
  9. This question paper consists of 6 (including this cover page) pages.
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Question 1 – Software Testing [15]

- 1.1 List any **three stages** of **acceptance testing** that a system such as the plantation tracking system (described in the CASE STUDY) has to go through before acceptance from the development team. (3)
- 1.2 a. Briefly **describe partition testing**. (1)
- b. Provide **three tests** that you would perform on the farmers' **profile code** variable (described in the CASE STUDY) using **partition testing**. For each test, describe **what** will be tested, as well as the **implication** of such a test. (6)
- 1.3 Briefly **describe** how **test-driven development** works. (5)

Question 2 – Security Engineering [14]

- 2.1 When dealing with security engineering, threats to a system can be used as a starting point for identifying possible attacks or misuse cases on the system. **Name** and **describe three classifications** of **threats** that can be used for this identification of possible attacks or misuse cases. (6)
- 2.2 **List** any **two** general **design guidelines** that must be considered for **Secure System Engineering**. (2)
- 2.3 **Propose** a complete **survivability strategy** for dealing with the potential **corruption** of the **historic data** used by the plantation tracking system (in the CASE STUDY). For each strategy, provide **one example** of how it can be achieved. (6)

Question 3 – Dependability and Security Assurance [12]

- 3.1 List the **two reasons** why **critical systems** require stringent **testing** and **analysis**. (2)
- 3.2 Use a **diagram** to illustrate how the **static analysis** technique of **Model Checking** works. (8)
- 3.3 Briefly **describe** the **role** played by automated static **analyzers** in Automatic static **analysis**. (2)

Question 4 – Software Evolution [12]

- 4.1 List the **three** stages that each software system has to go through in its **life cycle**, once beyond its **initial development**. (3)
- 4.2 List **four reasons** why it is usually **more expensive** to add functionality after a system is in **operation** than it is to implement the system functionality during **development**. (4)
- 4.3 Perform an **assessment** of the **business value** of the South Gauteng Farmers Association's legacy system (described in the CASE STUDY). Show how you've reached your answer by justifying it. (5)

Question 5 – Project Management [14]

- 5.1 A project manager's job description varies depending on the organisation and project that he or she is involved in; however there are five activities that most project managers may take responsibility for. List these **five activities** of a **project manager**. (5)
- 5.2 Briefly **describe** the **process** of **risk management**. (4)
- 5.3 Briefly **describe two examples** of **estimation risks**. (2)
- 5.4 a. Which **personality type** would you categorise the members of eJozi Consulting's development team (described in the CASE STUDY) as? (1)
- b. Do the members of eJozi Consulting's development team (described in the CASE STUDY) form a **cohesive group**? Provide a reason for your (2)

answer.

Question 6 – Project Planning [14]

- 6.1 Use a **diagram** to **illustrate** an **activity bar chart** for the software development project (described in the CASE STUDY), based on the **high-level project time-line** presented in Table 1. Make sure to take note of the duration, dependencies and end deliverables of each task. (4)
- 6.2 Briefly **name** and **describe three factors** affecting **software pricing**. (6)
- 6.3 Use **basic algorithmic cost modelling** to determine if the R80 000 estimated by eJozi Consulting (as described in the CASE STUDY) will be sufficient for the project. Base your cost estimation on the cost modelling variables identified in Table 2. (4)

Question 7 – Quality Management [14]

- 7.1 Briefly **name** and **describe** the **two** related **types** of software engineering **standards** that may be **defined** and **used** in software **quality management**. (4)
- 7.2 a. **List** the **three external software quality attributes** that may be predicted with a measure of the **number of lines** of **code** in a program. (3)
- b. **List two internal attributes** of a system that may be used to determine a measure of the **usability** of a system. (2)
- 7.3 Briefly **describe** how the **process** of **product measurement** may take place. (5)

Question 8 – Configuration Management [12]

- 8.1 Briefly **distinguish** between a **Codeline** and a **Baselines** in relation to **Configuration Management?** (2)
- 8.2 Briefly **describe the five factors** that should be taken into account when **deciding** whether a **change** should be **approved**, during **change management**. (5)
- 8.4 **List five technical and organizational factors** that should be taken into account when **deciding when** to **release a new version** of a system. (5)

Question 9 – Process Improvement [13]

- 9.1 List **five** important **factors** that affect the **quality** of products (such as software products), when quality depends on design? (5)
- 9.2 Briefly **describe the three types** of **process metrics** that can be collected. (3)
- 9.3 Use a **diagram** to **illustrate a process capability profile** to rate the South Gauteng Farmers Association's planning, verification, validation and training process areas (as described in the CASE STUDY). (5)

Question 10 – Component-based software Engineering [12]

- 10.1 Briefly **name** and **describe** the **two types** of **Component Base Software Engineering Processes**. (4)
- 10.2 Use **UML notation** to **draw a diagram** illustrating the different **types** of **component compositions**. Ensure that **each composition** is **labelled** accordingly. (6)
- 10.3 In terms of **component compositions**, what is considered as a good **composition principle?** (2)

Question 11 – Service-Oriented Architecture [10]

- 11.1 **What** does the **acronym WSDL** stand for? (1)
- 11.2 **Name** the **three** main **stakeholders** in a **Service-Oriented Architecture**. (3)
- 11.3 **List** the **three** logical **stages** in the service interface design. (3)
- 11.4 **Name** the **three** fundamental **types** of **services** that may be identified during **service engineering**. (3)

Question 12 – Legal and Ethical Aspects of IT [8]

- 12.1 a. What is a **copyright**? (1)  
b. A copyright does not need to be registered; however it does have three requirements. **List** these **three requirements** for copyrights. (3)
- 12.2 Briefly **name** and **describe one** common **problem** associated with **obtaining domain names**. (2)
- 12.3 When streaming music from your favorite online radio, you realize that your IP address, number of visits, actual page visits and log information are all recorded by the website once you have logged in. There is a link to the privacy policy at the bottom of each web page, which informs you of these actions. So even if you have not read the policy before, you have consented to the website collecting your data. Is the above **web agreement valid** and **enforceable by law**? **Motivate** your answer. (2)