MOI UNIVERSITY
SCHOOL OF INFORMATION SCIENCES
BSC. IN INFORMATICS
INF 470E: SOFTWARE ENGINEERING
PROJECT AND SEMINAR QUESTIONS - [40 MARKS]

Instructions

- *All group members **MUST** participate.*
- *Presentations during Seminars **SHOULD** be in MS-Powerpoint.*
- *Write-ups **SHOULD** be handed in during presentations.*
- *Use clear illustrations where necessary.*
- *Project Demonstrations are a **MUST** at the end of the semester.*

CASE STUDY – AS PROVIDED (NATIONAL EDUCATION MANAGEMENT INTEGRATED SYSTEM – NEMIS)

SYSTEM DESCRIPTION

The Ministry of Education (MOE) is in the progress of consolidating ALL Public schools and institutions records and wants to install the new self-service national education integrated system. The following are some of the business rules governing the application:

- The system includes ALL Public institutions from ECDE, Primary, Secondary, Tertiary Institutions.
- Every student, teacher, school/institution has some history.
- The system allocates a six-character unique personal identifier to each student for life.
- The identifier will take the form 'AA-BB-00'.
- The code allocated to schools will be a two character 'AA'.
- The student database will contain student name and other details on registration, transfers and performance progression tables.
- The teacher database will include teacher name, TSC no. and other registration details, etc, posting history, teaching specializations and responsibilities, if any.
- The school/institution details will include school name and other registration details, infrastructure, assets, equipment, teaching and learning materials.
- The KNEC database will include the national examination details, student details, school details, teacher details, etc.
- The Ministry of Education database should also include Policy documents,
- Other stakeholders in the system will include the Kenya Institute of Curricula Development (KICD) and Potential Employers.

The Ministry of Education wants to roll out the system functionality as fast as it can be made available, probably by the beginning of next academic year 2017/2018. They want to engage student/teacher-lead focus groups to assess the quality and acceptance of the application. They are also concerned with the security and integration of the

application with the other government systems. The system development is not without risks however, as your team of software engineers has very limited experience with the kind of networking complexity and distributed computing involved in this project. The MOE and has hired your team of Software Engineers to undertake the project.

NB:

- ***You are required to sample at least 5 examples for each school/institution category.***
- ***You are required to progressively sample the following stakeholders: Student, School/Institution, KNEC.***
- ***You are allowed to make any further assumptions.***

PROJECT QUESTION - COMPULSORY[20 MARKS]

REQUIRED

1. Draw the **physical architecture** of this system, identifying the different **clients** and **servers** that are involved. How would you describe this system in terms of the number of tiers?
2. Identify the key **Functional** and **Non-functional** requirements of the application.
3. Identify and describe the different **software modules** that may be involved in this system and using a **Programming Language** of your choice, develop a prototype of the NEMIS application.

SEMINAR QUESTIONS – FOR EACH GROUP [20 MARKS]

QUESTION 1

Demonstrate how you would apply the following Requirements Elicitation Techniques:

a) Student/teacher-lead focus groups discussions

b) Joint Application Development (JAD) Sessions

What are some of the **mistakes** your team is likely to make during requirements elicitation using each of the techniques above?

QUESTION 2

Justify why you would consider using the following **software process** approaches for the NEMIS system:

a) SCRUM

b) Service oriented engineering

What issues have contributed to the success of each approach?

QUESTION 3

As a team of software engineers, you are required to use the Object-oriented software engineering approach as well as using Computer-Aided Software Engineering (CASE) tools which are designed to help developers manage complexity in software projects.

a) Identify any **FIVE** of the **case tools** you will use in each of the SDLC phases and demonstrate how your team will utilize each one of them.

b) Identify the **class name**, the **class responsibilities** and **collaborators** (**CRC**) for each class involved in the registration of a student in a school/institution and produce a UML **state diagram** that defines the states and transitions for the object (or objects) involved in implementing the rules that control the registration, grade submission, grade visibility, and transferring of a student to another school/institution student.

QUESTION 4

c) Supposing that you were using the Extreme Programming (XP) approach, demonstrate how you would use **test-case generation** to test the validity of a Student's KNEC Certificate.

d) Assume that the TSC enters a valid PIN number to determine a Teacher's promotion based on some Evaluation process. Illustrate the interaction using **a sequence diagram** between the different objects involved in the process.

QUESTION 5

Before delivering the software system to your client, the software must undergo some software configuration management.

a) What is the importance of **Software Standards and Software Metrics** in the above project?

b) Describe the **McCabe's Cyclomatic Software Metric** and how it can be used in software development.

QUESTION 6

Before delivering the software system to your client, the software must undergo some software testing and evaluation.

a) Explain the term "**Software Testing**" and describe the various **levels of testing** that you would apply in the above system.

b) Describe how you would apply the **COCOMO** model as a software development effort estimation method.

===== END =====