STRATHMORE UNIVERSITY

FACULTY OF INFORMATION TECHNOLOGY

Bachelor of Business Information Technology

END OF SEMESTER EXAMINATION (FT)

BBT 4602: SOFTWARE ENGINEERING

DATE: **TIME**: 2 Hours

Instructions: Answer **Three** Questions. **Question 1** is compulsory.

Question 1

(a) How would you define the terms *software* and *software process*? [2 Marks]

(b) Why "engineering" in the term software engineering? [1 Mark]

(c) In your view, what is the single most important goal of software engineering? [1 Mark]

(d) Distinguish between the following [2 Marks]
   i) Prescriptive and Agile process models
   ii) Upper-CASE and Lower-CASE tools

(e) State and explain the five key components/stages of the generic software process framework [5 Marks]

(f) Briefly distinguish between algebraic and model-based formal specification techniques [2 Marks]

(g) How would you describe equivalence partitioning, a popular black-box testing strategy [2 Marks]

(h) Present an argument against Gantt-charts as a project scheduling tool [2 Marks]

(i) Maria is the project manager for a software project charged with developing and delivering a word processing application for a key client. The client wishes to start using the products for basic word processing tasks within two months. However, Maria estimates the fully-fledged application will take at least six months to complete. As an IT strategy consultant, what would your advice Maria to adopt in terms of process model or process in order to satisfy the client? Why? Assume she has no immediate staffing limitations. [3 Marks]

TOTAL: 20 Marks

Question 2

(a) "The seeds of major software disasters are usually sown in the first three months of commencing the software project" – Capers Jones
What do you think Jones was referring to in this statement? [2 Marks]

(b) List and briefly discuss the five main tasks carried out in a typical requirements engineering exercise [10 Marks]

(c) *Problem Statement on a Pool Centre Management System:* The players of the Pool Centre can be either members or non-members of the Pool Centre. The details of members such as name, address and phone

number are already stored in database and they are provided with identification number. Non-members have to provide their name and address before start playing.

The players may request a catalogue showing table numbers and the availability of tables in terms of hours. Players can select tables and should specify the hours they want to play. The player is intimated once the time is over. They have the option to either extend the game if there are no waiting members or stop the game. The registration system sends information to the billing system so that the buyer can pay the bill. If all the play boards are occupied incoming players are kept in the waiting list. Players can book the table or cancel the table in advance. The main functions of the system could be envisioned as:

- Maintaining current players information
- Waiting list of the players who would like to play next
- Membership provision – becoming a member at the centre
- Booking provision at the centre
- Billing system to deliver the charges for the facilities availed at the centre

Required: Provide a first-cut analysis model of the above existing system using a Level 1 DFD [8 Marks]

TOTAL: 20 Marks

Question 3

(a) The first phase of architectural design involves system structuring. Outline two main structure models, while giving some of their respective pros and cons [6 Marks]

(b) Component-level design is an important stage in software design

i) State and briefly discuss any two class-based component design principles, detailing any heuristics that have been suggested as aids to achieve them [4 Marks]

ii) State and briefly explain FOUR types of cohesion that a software designer may come across in the component-level design exercise? [4 Marks]

(c) Interface design is one of the core framework activities involved in user interface design. Outline the FOUR steps involved in this activity [4 Marks]

(d) Juma has been commissioned as a software engineer to recommend an architectural design for an upcoming software product. He knows that the subsystems will need to be loosely coupled and that data interchange between the subsystems will be rare and therefore a non-issue. What structural model would you recommend and why? [2 Marks]

TOTAL: 20 Marks

Question 4

(a) Distinguish between

i) Verification and Validation [2 Marks]

ii) Smoke testing and regression testing [2 Marks]

iii) Alpha testing and beta testing [2 Marks]

(b) List and describe the steps involved in a conventional software testing strategy [4 Marks]

(c) Give at least two examples in which black-box testing might give the impression that “everything is OK” while white box tests might uncover an error. Give at least two examples in which white-box testing might give the impression that “everything is OK”, while black-box tests might uncover an error. [4 Marks]

(d) Situation:

A program reads three integer values. The three values are interpreted as representing the lengths of the sides of a triangle. The program prints a message that states whether the triangle is scalene, isosceles or equilateral.

Required:

Develop a set of test cases that you feel will adequately test this program. [6 Marks]

[***Note**: For full credit, please specify the class and type of each test case.]*

TOTAL: 20 Marks

Question 5

(a) LOC (Lines of Code) is a popular software metric:

i) What two arguments do its proponents propose in its support? [2 Marks]

ii) What two criticisms are levelled against LOC? [2 Marks]

(b) State and briefly explain any two object oriented metrics [2 Marks]

(c) Outline an approach used for estimation for object oriented projects [3 Marks]

(d) Use the COCOMO II model to estimate the effort required to build software for a simple ATM that produces 12 screens, 10 reports and will require approximately 80 software components. Assume average complexity and average developer/environment maturity. Use the application composition model with object points. [4 Marks]

(e) In project scheduling, the project manager has to be aware of the tasks/activities that lie in the critical path of the task/activity network. What do we mean by critical path? Can you identify and explain 2 tasks in your current 4^{th} year IS project that may lie in the critical path? [3 Marks]

(f) What are the four elements that exist when an effective SCM system is implemented? Discuss each briefly [4 Marks]

TOTAL: 20 Marks