# University of Swaziland

## DEPARTMENT OF COMPUTER SCIENCE

## Supplementary Examination 2006/2007

*Title of paper* : *Software Engineering I*

*Course number : CS451/461*

*Time Allowed : Three(3) hours*

*Instructions* :

- *Each question is worth 25 marks*
- *Answer Question 1*
- *Answer any three(3) questions from questions 2 to 6*

*This paper may not be opened until permission has been granted by the invigilator*

# Question 1 - compulsory

Described below is the operation of *Entek Electronics (Pty) Ltd*

(a) Draw a context diagram for *Entek Electronics*          *5 marks*

( b) Draw a top-level (level 1) logical data flow diagram for *Entek Electronics*

*20  marks*

## Entek Electronics (pty) ltd

Entek electronics manufactures and deliveries consumable electronic items to its customers. It has three production facilities, each specializing in a range of items. Manufactured items are sent to anyone of about 20 depots where they are stored. Customer orders are received at he depots and each depot arranges deliveries of items ordered at the depot to customers.

The following set up is to determine how to satisfy verified orders as quickly as possible. If the items ordered are available at the depot that received the order, a local delivery advice and an invoice are generated for the order. If the items are not available at the depot, but are available at another depot, a transfer delivery advice is generated. This advice requests the second depot to transfer the needed items to the depot that received the order. If the items are not available at any of the depots, then the customer is informed that the order cannot be me quickly.

Delivery advices are used to prepare deliveries and delivery dockets by the store at the depot. At the same time transport requests are sent to vehicle schedulers to arrange vehicles to deliver the ordered items. The delivery dockets are then sent by the store to the scheduled truck for delivery.

# Question 2

Based on the description of *Entek Electronics* and the DFD obtained in question 1 above,

(a) Identify two (2) entities and draw their entity life history diagrams. *10 marks*

(b) Draw an entity life history matrix for *Entek Electronics*. *15 marks*

# Question 3

(a) Using Armstrong's axioms, state and prove the correctness of the **Pseudo-transitivity** rule. *3 marks*

(b) Explain the meaning of the following forms, giving examples where possible.

      (i)     First-Normal Form (1NF) *2 marks*

      (ii)    Second-Normal Form (2NF) *2 marks*

      (iii)   Third-Normal Form (3NF) *2 marks*

      (iv)   Lossless Decomposition *2 marks*

      (v)    Dependency Preserving. *2 marks*

(c) Consider the following CUSTOMER-INVOICE

| CUSTOMER -INVOICE | | | |
|---|---|---|---|
| **Invoice#:** 27321 | | | |
| **Customer# :** *500* | | **Course Name:** *Musa Khumalo* | |
| **Customer Address:** *P.0. Box 28282* *Mbhuleni* *Swaziland* *M206* | | | |
| **Services** | | | |
| | | | |
| **ServiceCode** | **Service Description** | **Service Date** | **Cost** |
| *101* | *Consultation* | *10 Sept 2001* | *E 780* |
| *965* | *Training* | *7 June 2003* | *E 5500* |
| | | | |

Describe the data contained in the CUSTOMER-INVOICE in *Unnormalized form, First normal form, Second normal form* and *Third normal form* relations. *12 marks*

# Question 4

(a) Discuss the main contents of a project plan.                    *5 marks*

(b) Consider the following project schedule.

| Activity | Predecessor | Duration (days) | Cost (E/ day) |
|---|---|---|---|
| A | NONE | 5 | E140 |
| B | NONE | 9 | E150 |
| C | B | 4 | E50 |
| D | A | 3 | E40 |
| E | B | 8 | E105 |
| F | C | 6 | E60 |
| G | D | 13 | E90 |
| H | E | 17 | E110 |
| I | E | 11 | E80 |
| J | G | 14 | E70 |
| K | D | 3 | E130 |
| L | F,I,G | 2 | E75 |
| M | K,H,L | 7 | E250 |

(i) Draw a Gantt chart for above project plan.                    *6 marks*

(ii) Draw a PERT diagram for the above project plan.              *6 marks*

(iii) What is the earliest completion time for the project?       *3 marks*

(iv) What is the critical path of the project?                    *2 marks*

(v) What is the additional cost to the project if task F was delayed by 10 days? *3 marks*

# Question 5

(a)

*"Software development is a partnership between the system developer and the client"*

Discuss the significance and extent of this partnership, noting its particular challenges and how these challenges can be managed.                    *7 marks*

(b) Discuss the role of prototyping in software development, making particular reference to the different ways in which it may be used. Explain some of the advantages and disadvantages of prototyping.                    *10 marks*

(c) Data Flow Modeling depends on a number of complementary techniques to completely describe a software system. Briefly describe (narrative) these techniques, explaining how they complement data flow modeling.                    *8 marks*

# Question 6

**The following narrative is the procedure used by an Employment Bureau:**

Patience Employment Bureau operates the following procedure for registering office typists:

Every applicant for office typing work has to take our speed and competence test. Applicants getting 25% or less are not registered, no matter what they have said on their application form.

Applicants who get between 25% and 50% are still not very welcome and we only place them on our branch provisional list if they have City and Guilds Certificate and nave had at least two years' relevant experience.

Applicants who get 50% through 75% are a better prospect. If they have got two years' experience or if they have City and Guilds certificate they are put on a provisional list, but if they do not have either they are not registered at all.

Applicants obtaining over 75% go straight onto our citywide circulation sheet unless they don't have relevant experience and they don't have the city and Guilds certificate, in which case they are only placed on the provisional list.

  a) Draw a decision tree for the decision procedure as explained above.

*12 Marks*

  b) Draw a decision tree for the decision procedure as explained above.

*13 Marks*