

University of Eswatini

# Department of Computer Science

Supplementary/Re-sit Examination

2018/19

*Title of Paper: Software Engineering I/Practices in Software Engineering I*

*Course Number: CS451/CSC392*

*Time Allowed: Three (3) hours*

*Instructions: ANSWER ALL QUESTIONS*

*You are not allowed to open this paper until you have been told to do so by the invigilator.*

## Question 1

a) Define the following:

- i) 1NF [1]
- ii) 2NF [1]
- iii) 3NF [1]
- iv) Functional dependency [1]
- v) Partial dependency [1]

b) Draw a context diagram and a physical DFD for the scenario below. [5+15]

### **PIZZA BELLA**

A large pizza business makes pizzas and sells them. The pizzas are manufactured and kept in cold storage for not more than two weeks.

The business is split into a number of functional units. There is Production Control, Manufacturing, Stores, Accounts, Sales, Shipping and Purchasing. Production Control are responsible for organising which pizzas to produce in what order and in what quantity. They need to schedule the production of the pizzas according to the current and expected sales orders together with the number of pizzas already in Stores. Manufacturing take the raw materials from the Stores and manufacture pizzas returning the completed goods to the Stores. Accounts deal with the payments for the pizzas when delivered to the customer and the payment to the suppliers of the raw materials. Sales deal with customer orders whilst Purchasing organise the buying of raw material from suppliers. Shipping manage the packing and delivery of the goods to the customer with a delivery note.

When a sales order is received by sales they record what is being ordered and by whom. They also record the details of the expected date of delivery. Production Control accesses this information and makes sure that, if required, pizzas are produced by Manufacturing and are ready in Stores for when the delivery needs to be made.

After the delivery is made Accounts make sure that the customer receives an invoice and that payment for the invoice is received at which time a receipt is issued. Purchasing looks at the current stock of raw materials and by using current stock levels, supplier turnaround times and quantity to be ordered decide what needs to be ordered on a daily basis. Their aim is never to run out of an ingredient but to minimise the amount of raw material kept in stock.

## Question 2

- a) Draw a decision tree for the prospecting company below? [20]
- b) What would you recommend MDG should do and why? [5]

The Metal Discovery Group (MDG) is a company set up to conduct geological explorations of parcels of land in order to ascertain whether significant metal deposits (worthy of further commercial exploitation) are present or not. Current MDG has an option to purchase outright a parcel of land for E3m.

If MDG purchases this parcel of land then it will conduct a geological exploration of the land. Past experience indicates that for the type of parcel of land under consideration geological explorations cost approximately E1m and yield significant metal deposits as follows:

- manganese 1% chance
- gold 0.05% chance
- silver 0.2% chance

Only one of these three metals is ever found (if at all), i.e. there is no chance of finding two or more of these metals and no chance of finding any other metal.

If manganese is found then the parcel of land can be sold for E30m, if gold is found then the parcel of land can be sold for E250m and if silver is found the parcel of land can be sold for E150m.

MDG can, if they wish, pay E750,000 for the right to conduct a three-day test exploration before deciding whether to purchase the parcel of land or not. Such three-day test explorations can only give a preliminary indication of whether significant metal deposits are present or not and past experience indicates that three-day test explorations cost E250,000 and indicate that significant metal deposits are present 50% of the time.

If the three-day test exploration indicates significant metal deposits then the chances of finding manganese, gold and silver increase to 3%, 2% and 1% respectively. If the three-day test exploration fails to indicate significant metal deposits then the chances of finding manganese, gold and silver decrease to 0.75%, 0.04% and 0.175% respectively.

### Question 3

a) Model the information below using an E-R diagram. [15 marks]

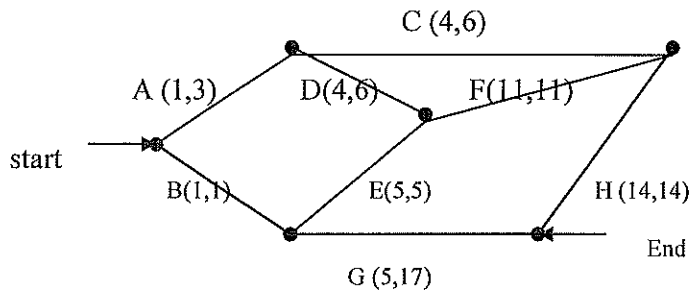
The national football association (NFA) of Swaziland requires a system to manage player and team information. Initial analysis has determined the following information needs:

The association runs a league that consists of a number of divisions. Each division consists of a number of teams. Each division has between 12 and 18 teams and each team may register a maximum of 25 players for any given season. Divisions have unique names and teams in each division have unique names. Each player is given a unique registration card. The card contains information such as a unique player registration number, the players name, age, address, telephone number and the name of the team he/she plays for and its division.

The season starts in August and ends in May. Each player plays for a single team at any given time. Players may change teams during the season or during the off-season. The association must commission any change of team and such change must be reflected on the player's registration card. To keep track of the players' history and ensure consistent information for each player, the player keeps the same registration card even if he/she moves to another team. The player's registration card remains a property of the association such when the player's days are over the card should be returned to the association. The player stops playing when he is permanently injured, banned for life, retired or deceased. Retirement could be voluntarily or on medical grounds.

For each season, for players who are goalkeepers the number of goals conceded is recorded. For other players the number of goals scored is recorded as well the assist count.

b) Present the PERT diagram below in form of a table with fields: Task, Duration and Predecessor. The ECT is 20. [10]



#### Question 4

- a) Discuss the symmetric model in detail. State how it is different from the sequential and waterfall models. [15]
- b) A well written SRS is expected to have a number of qualities. Among them are traceability, design independence and conciseness. Discuss the meaning of these three qualities. [6]
- c) In ER modeling, the quantification of relationships are known as mappings, name any four (4) of these mappings. [4]

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