WOMEN'S UNIVERSITY IN AFRICA

Addressing gender disparity and fostering equity in University Education

FACULTY OF MANAGEMENT AND ENTREPRENEURIAL SCIENCES

BSc HONOURS DEGREE IN INFORMATION SYSTEMS

MAIN PAPER

IS321: DECISION SUPPORT SYSTEMS

INTAKE 22: THIRD YEAR SECOND SEMESTER

TIME: 2 HOURS MORNING

INSTRUCTIONS TO CANDIDATES

Answer any **four** questions.

Question 1

a) With the aid of clearly labelled diagrams describe the following data warehouse architectures:

i. Basic data warehouse architecture. [4]

ii. Data warehouse with staging area and data marts. [5]

b) "Dependent data marts can be used to bring sanity to an organization's data warehouse user community. With reference to an organization of your choice, discuss the reasons why an organization may be driven to create dependent data marts, thereby justifying the above assertion. [6]

c) Data mining can be used to discover patterns and relationships in information from data warehouses and data marts

i. Discuss using examples four different types of results that can be obtained from data mining operations [8]

ii. List two application areas of data mining [2]

Question 2

Explain the following components of Decision Support systems and their subdivisions:

a) Model Management Component; [10]

b) Data Management Component; [5]

c) User Interface Management Component; and [5]

d) Knowledge Management Component. [5]

Question 3

a) Describe the phases of Simon's decision making model [9]

b) Mashonaland East District has several High schools. The table below shows the current enrolment and the number of teachers assigned to each of the 8 schools in the district.

School	No. Of students	No. Of teachers
Kwenda High	1200	50
Daramombe High	1250	48
Uzumba High	1400	75
Waddilove High	1900	95
Mandedza High	2400	93
Marondera High	2500	110
Chemhanza High	2900	108
Makumbe Mission	3400	115

i. Use Simon's decision making model to formulate the problem. [2]

ii. The district has set a goal of 18 students per teacher. Use the ratio analysis to show whether this goal is achievable or not. [4]

iii. What two alternatives do you think can be used to achieve this goal? Give concrete solutions to each alternative [10]

Question 4

a) Strategies for decision making include:-

(i) Maximising; and

(ii) Satisficing

Explain the strategies giving case examples where each of the above strategies can be used [4]

b) A glass factory specializing in crystal is experiencing a substantial backlog, and the firm's management is considering three courses of action:

A) Arrange for subcontracting

B) Construct new facilities

C) Do nothing (no change)

The correct choice depends largely upon demand, which may be low, medium, or high. By consensus, management estimates the respective demand probabilities as 0.1, 0.5, and 0.4.

The management estimates the profits when choosing from the three alternatives (A, B, and C) under the differing probable levels of demand. These profits, in thousands of dollars are presented in the table below:

	Low	Medium	High
	(0.1)	**(0.5)**	**(0.4)**
A	**10**	**50**	**90**
B	**-120**	**25**	**200**
C	**20**	**40**	**60**

Given the payoffs in the table above:-

i. Manually create the decision tree. [4]

ii. Use the decision tree to choose the course of action that must be taken by management [7]

b) What do you understand by the term Group Decision Support System? [2]

c) With the aid of practical examples, discuss how Group Decision Support software improves the quality of the decisions made. [5]

d) Group decision support can take place in any of three scenarios. Identify and explain one of these group decision support scenarios. [3]

Question 5

Mylo runs a cafeteria situated on the ground floor of a large corporate office block. Each of the five floors of the building are occupied and there are in total 1,240 employees.

Mylo sells lunches and snacks in the cafeteria. The lunch menu is freshly prepared each morning and Mylo has to decide how many meals to make each day. As the office block is located in the city centre, there are several other places situated around the building where staff can buy their lunch, so the level of demand for lunches in the cafeteria is uncertain.

Mylo has analysed daily sales over the previous six months and established four possible demand levels and their associated probabilities. He has produced the following payoff table to show the daily profits which could be earned from the lunch sales in the cafeteria:

Demand level	**Probability**		**Supply level**		
		450	620	775	960
		$	$	$	$
450	0·15	1,170	980	810	740
620	0·30	1,170	1,612	1,395	1,290
775	0·40	1,170	1,612	2,015	1,785
960	0·15	1,170	1,612	2,015	2,496

a) Explain fully how you would arrive at a decision of the best strategy using the following Decision Rules:

i. Maximax rule [3]

ii. Maximin rule [3]

iii. Minimax rule [4]

iv. Hurwicz criterion [4]

v. Laplace criterion [4]

b) The Mobile Sandwich Co prepares sandwiches which it delivers and sells to employees at local businesses each day.

Demand varies between 325 and 400 sandwiches each day. As the day progresses, the price of the sandwiches is reduced and, at the end of the day, any sandwiches not sold are thrown away. The company has prepared a regret table to show the amount of profit which would be foregone each day at each supply level, given the varying daily levels of demand.

Regret table

Daily supply of sandwiches (units)					
		325	350	375	400
	325	$0	$21	$82	$120
Daily demand	350	$36	$0	$44	$78
for sandwiches (units)	375	$82	$40	$0	$34
	400	$142	$90	$52	$0

Applying the decision criterion of minimax regret, how many sandwiches should the company decide to supply each day? [7]

Question 6

a) Cement Co is a company specialising in the manufacture of cement, a product used in the building industry. The company has found that when weather conditions are good, the demand for cement increases since more building work is able to take place. Cement Co is now trying to work out the level of cement production for the coming year in order to maximise profits. The company has received the following estimates about the probable weather conditions and corresponding demand levels for the coming year:

Weather	Probability	Demand
Good	25%	350,000 bags
Average	45%	280,000 bags
Poor	30%	200,000 bags

Each bag of cement sells for $9 and costs $4 to make. If cement is unsold at the end of the year, it has to be disposed of at a cost of $0·50 per bag. Cement Co has decided to produce at one of the three levels of production to match forecast demand. It now has to decide which level of cement production to select.

i. Construct a pay-off table to show all the possible profit outcomes. [8]

ii. Determine the level of cement production the company should choose, based on the decision rule of maximin. Show your calculations clearly and justify your decision. [5]

b) Mary is the CEO of a clothing factory. She is wondering whether or not it is a good idea to expand her factory this year. The cost to expand her factory is $1.5M. If she expands the factory, she expects to receive $6M if economy is good and people continue to buy lots of gadgets, and $2M if economy is bad. If she does nothing and the economy stays good she expects $3M in revenue; while only $1M if the economy is bad. She also assumes that there is a 40% chance of a good economy and a 60% chance of a bad economy.

i. Draw a Decision Tree showing these alternatives. [6]

ii. Use the decision tree to choose the course of action that must be taken by Mary. Show calculation. [6]

END