BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

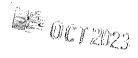
GRADUATE SCHOOL OF BUSINESS

MASTER OF BUSINESS LEADERSHIP

BUSINESS STATISTICS AND MANAGEMENT SCIENCE(MBL528)

EXAMINATION PAPER

DURATION: 3 HOURS



Instructions and information to Candidates

- 1. Answer all questions.
- 3. The paper carries six questions.
- 4. All questions in Section B carry equal marks of 20 each.
- 5. The use of cell phones is not allowed in the examination.
- 6. Authorized Materials: Non programmable Electronic Calculator & Mathematical Instruments

SECTION A (40 marks)

Candidates may attempt ALL questions being careful to number them A1 to A3.

A1. Define the following terms:

- (a) Null hypothesis, [2]
- (b) Alternative hypothesis, [2]
- (c) Confidence interval, and [2]
- (d) Critical region. [2]
- A2. Suppose we want to compare the means of 2 samples $n_1 = 10$, $n_2 = 7$ with means $\bar{x} = 4.2$ and $\bar{y} = 3.4$ and variances $s_1^2 = 49$ and $s_2^2 = 32$ respectively.
 - (a) State the formulae for finding the 95% confidence interval for the difference between 2 means. [3]
 - (b) Find the 95% confidence interval for the difference between the 2 means $\bar{x} \bar{y}$. [6]
 - (c) State the null hypothesis for testing the difference between 2 means. [3]
 - (d) Test the hypothesis that the means are equal. [6]
- A3. Given the following data from an experiment where we have variables x and y.

x	y		
3.0	3.3		
3.5	4.1		
4.2	5.6		
4.8	5.2		
5.0	5.9		
5.1	5.5		

- (a) State the model that is being estimated.
- (b) Write down the model estimation formula.

[2]

[2]

(c) A regression model was fitted to the data and yielded the following in SPSS

ANOVA

Model Sum of Squares df Mean Square Sig. 20.066 .011

1 4.280 Regression 4.280

4 .213

Residual .853

5

Total 5.133

a Dependent Variable: y b Predictors: (Constant), x

Coefficients

Model Unstandardized Coefficients Standardized Coefficients t Sig.

Std. Error Beta 1 (Constant) .353 1.040 .339 .752 1.074 .240 .913 4.479 .011

a Dependent Variable: y

- (i) From the SPSS output above obtain the regression model and state whether all parameters are significant. [2,2]
- (ii) Interpret the ANOVA table and state if regression is significant.

[4]

A4. (a) Briefly explain the uses of inventory control. [2]

(b) A company stocks an item that is consumed at the rate of 80 units a day. It costs the company \$30 each time an order is placed. A unit inventory held in stock per day costs \$0.90. Assuming that there are no shortages, determine the optimum order quantity. [6]

SECTION B (60 marks)

Candidates may attempt THREE questions being careful to number them B4 to B6.

B5. Reddy Mikks produces both interior and exterior paint from 2 raw materials M1 and M2. The following table shows

	Tons of Raw Material		
Resource	$Exterior Paint \ 1$	InteriorPaint 2	V
			Availability(tons)
Raw Material(M1)	6	4	24
Raw Material(M2)	1	2	6
Profit per unit	\$5	\$4	

[4]

A market survey indicates that the daily demand of interior paint cannot exceed that of exterior paint by more than 1 ton. Also, the maximum demand daily for interior paint is 2 tons.

- (a) Formulate the linear programming problem.
- (b) Use the graphical method to determine the optimal resource allocation. [6]
- (c) Use the simplex method to determine the optimal daily resource allocation for each activity. [8]
- (d) State the best decision for the manager. [2]
- **B6.** (a) Define the following:
 - (i) minimax, and [2]
 - (ii) expected value criterion. [2]
 - (b) The manager of Glo Chemicals must decide whether to process a chemical or to contract it out at a cost of \$20 000. The final product batch will be sold for \$40 000. In-house processing involves direct costs for raw materials of \$4 000 and the first step, costing \$2 000, is chlorosulfanation, for which there is an 80% chance of getting a satisfactory intermediate chemical base. If the base is unsatisfactory, there will be insufficient time to start a new batch, but there will still be a chance of turning down the order or contracting out the production. In the latter case, there is 60% chance of being too late and having to dump the product. The last stage of in-house processing may be a low-temperature one costing \$10 000 and a 30% chance of failure resulting in the final product being dumped or a high temperature one costing \$16 000 which is certain to work.
 - (i) Using revenue minus costs as payoff construct the manager's decision tree. [13]
 - (ii) Which action maximizes the expected payoff? [3
- B7. (a) Define a transportation problem.

[4]

(b) What is the aim of Vogel's method.

- [2]
- (c) Perform one iteration of Vogel's approximation method to solve the following transportation problem.

Supplier	Destination			Supply		
	1	2	3	4	5	
1	2	4	6	5	7	4
2	7	6	3	M	4	6
3	8	7	5	2	5	6
4	0	0	0	0	0	4
Demand	4	4	2	5	5	

8

(d) Describe a Transshipment problem.

[6]

END OF EXAMINATION PAPER.