

BACHELOR OF COMMERCE (HONOURS) DEGREE

QUANTITATIVE ANALYSIS FOR BUSINESS CIN 1106

SUPPLEMENTARY EXAMINATION JULY 2001

DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Answer all questions in Section A
2. Choose and answer three(3) out of (5) questions in Section B
3. Answer both questions in Section C
4. Graph paper will be provided
5. Statistical tables will be provided
6. You may use a non-programmable Scientific Calculator

SECTION A (ANSWER ALL QUESTIONS)

[40 MARKS]

QUESTION ONE

- a) A manufacturer of light bulbs finds that the total cost 'C' of producing x units of a product is given by :

$$C(x) = 0,001x^3 - 0,21x^2 + 40x + 1000$$

Determine the marginal cost when the level of production is $x=50$.

[5 marks]

- b) For the following distribution of marks:

No. of Students	10	20	15	8	3
Marks	1-<20	20-<40	40-<60	60-<80	80-<100

Calculate:

- i) the Mode **[5 marks]**
ii) the Median **[5 marks]**

- c) Maximize:

$$Z = 2x_1 + 3x_2$$

Subject to: $x_1 + x_2 \leq 100$

$$4x_1 + 8x_2 \leq 500$$

$$x_1, x_2 \geq 0$$

[10 marks]

- d) Find the solution set for each of the following inequalities:

i) $4x/(x-4) > 3$

ii) $7x-2 < (4x-2)/3$

[10 marks]

- e) A manufacturer produces 2 products, 1 and 2. One unit of product 1 requires 3 parts of type A and 2 parts of type B. One unit of product 2 requires 1 type A part, 4 type B parts and 2 type C parts. Use a 2x3 Matrix to depict the information.

[5 marks]

SECTION B (CHOOSE AND ANSWER 3 OUT OF 5 QUESTIONS)

[60 MARKS]

The following table relates to a 3 Industry Economy:

USER

PRODUCER	AGRICULTURE	INDUSTRY	TRANSPORT	FINAL CONSUMER DEMAND
AGRICULTURE	12	12	5	31
INDUSTRY	8	24	10	38
TRANSPORT	5	16	8	11

If consumer demand for agriculture is predicted to increase to 35, Industry to 40 and transport to 12, what is the required level of output to satisfy the new demand?

[20 marks]

QUESTION THREE

- a) The population of bacteria (in millions) present in a culture at time 't' is given by:

$$N(t) = (t-8)(5t) + 40.$$

At what rate is the population changing at time t=3; t=5?

- b) A firm estimates that the number 'N' of units of a product sold after spending x dollars on advertising is given by $N(x) = -0.1x^2 + 200x + 60$.

- i) How many units are sold when \$ 500,00 is spent on advertising?
- ii) What is the instantaneous rate of change of the number of units sold with respect to the amount spent on advertising
- iii) What is the instantaneous rate of change in sales at x=900; x=1000?

[20 marks]

QUESTION FOUR

Lucky Luke has decided to set up a Sinking Fund for the purpose of purchasing a HI-FI system. He will need \$ 30 000 in two years time while the fund will earn 10% interest compounded quarterly.

- a) calculate the regular deposit, R.
- b) Construct the Sinking Fund Schedule
- c) What is the Accumulated Fund after the 3rd deposit?

[20 marks]

QUESTION FIVE

Using the Gauss-Jordan method, find the inverse of the matrix below, if it exists:

$$\begin{bmatrix} \phi & 2 & 3 & \kappa \\ 2 & 3 & 4 & \\ \lambda & 2 & 1 & \mu \end{bmatrix}$$

- b) Use matrix methods to solve the following system of linear equations:

$$2x_1 + 6x_2 - x_3 = 18$$

$$x_2 + 3x_3 = 9$$

$$3x_1 - 5x_2 + 8x_3 = 4$$

[20 marks]

QUESTION SIX

Given $R(x) = 50x$

$$C(x) = 2x^3 - 12x^2 + 40x + 10,$$

Find:

- a) $P(x)$
- b) $R(2), C(2), P(2)$
- c) $R^*(x), C^*(x), P^*(x)$
- d) $R^*(2), C^*(2), P^*(2)$

What is your interpretation of the Marginal revenue function $R^*(x)$ in this problem?

- f) What is your interpretation of your Marginal cost function in this problem, vis-à-vis fixed cost?

[20 marks]

SECTION C (COMPULSORY)

[40 MARKS]

You borrow \$ 30 000 from the bank for purposes of paying for your Post-graduate Project. If Interest is charged at the rate of 16% Compounded quarterly and the loan is for a period of 2 years,

- a) Calculate the Regular payment, R.

- b) Construct the relevant Amortization schedule.
- c) How much is outstanding after the 6th payment?
- d) What are the Interest and Capital portions of the 5th payment?

[20 marks]

QUESTION EIGHT

- a) What are the problems(points to note) in the construction of Index numbers?
[8 marks]
- b) The table below shows the unit price and quantity of rice, sugar and salt consumed by a certain household in 1996 and 1998.

	1996		1998	
PRODUCT	PRICE \$	QUANTITY(KG)	PRICE \$	QUANTITY(KG)
RICE	12	25	18	15
SUGAR	24	30	37	24
SALT	2,7	6	6,5	6

(1996=100)

Calculate:

- i) The Unweighted Aggregative Price Index.
- ii) Fischer's Ideal Index

[12 marks]

[Total: 20 marks]

END OF EXAMINATION