UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

FACULTY OF BUSINESS ADMINISTRATION AND MANAGEMENT

FINAL EXAMINATIONS FOR BACHELOR OF BUSINESS ADMINISTRATION AND MANAGEMENT: JULY INTAKE

SEMESTER I, 2021/2022

YEAR I

QM 1201: QUANTITATIVE METHODS I

DATE: 31/1/2022

TIME: 2:00 pm – 5:00 pm

DURATION: 3 hours

Instructions

1. Carefully read through ALL the questions before attempting
2. Attempt FOUR questions
3. All questions carry equal marks
4. Ensure that your registration number is clearly indicated on the answer booklet
5. Do not write on the question paper

Question 1

(i) Explain with relevant examples, the difference between qualitative and quantitative data in statistics [7 marks]

(ii) Before any analysis is carried out on quantitative data, it has to first be generated. Explain ways through which one can generate quantitative data. [8 marks]

(iii) Quantitative methods assist the decision making process combined with other information in making a process. Explain the steps involved in this decision making process [10 marks]

Question 2

(i) Matrices are useful in different fields of science and business. Explain with a relevant example the importance of matrices in business [5 marks]

(ii) Fred invested in bonds and shares of stock in year one as follows; 10% in bonds and 15% in shares of stock. His income during year 1 was $4,000. In the second year, he invested 12% in bonds and 16.5% in shares of stock. His income in year 2 was $4,500. Determine using matrix method his initial investment in bonds and shares of stock. [14 marks]

(iii) Determine the value of **P.Q** in the following matrices:-

$$\mathbf{P} = \begin{pmatrix} 12 & 8 & 7 \\ 20 & 15 & 30 \\ 11 & 9 & 13 \end{pmatrix} \qquad \mathbf{Q} = \begin{pmatrix} 21 & 4 & 11 \\ 7 & 3 & 6 \\ 16 & 8 & 5 \end{pmatrix}$$

[6 marks]

Question 3

(a) Define the following terms:-

(i) Breakeven point [1 mark]

(ii) Breakeven price [1 mark]

(iii) Breakeven quantity [1 mark]

(b) The demand function for items in a sales company is given by: $P = \frac{1000}{\sqrt{Q}}$; where Q is the demand for items at a given price, P in dollars. The cost of producing Q items is given by the following cost function $C = 10Q + 100\sqrt{Q} + 10{,}000$. Determine the following at Q = 100 units:-

(i) Marginal cost [3 marks]

(ii) Marginal revenue [4 marks]

(iii) Marginal profit [4 marks]

(iv) Average marginal revenue [2 marks]

(iv) Breakeven point [3 marks]

(c) The cost function of a firm is given by the expression $C = 20x^2 + 5y^2 - 8xy + 4$. If the marginal cost of both labor hours and machine hours is \$1400, determine the number of hours of each input to be used. [6 marks]

Question 4

(a) Answer the following questions:-

(i) Define linear programming [2 marks]

(ii) Outline the steps involved in formulation of a LPP [5 marks]

(b) A Manufacturing firm produces two types of merchandise; F and G. F requires 8 hours of labour while G requires 10 hours of labour. F consumes 2 kg of raw materials and G consumes 4 kg of raw materials. In any week, only 800 hrs of labour and 280 kg of raw materials are available. In whatever situation, at least 20 units of each product must be produced. Each unit of F generates a profit of 12,000/= and G generates 9,000/= per unit.

(i) Formulate the objective function for the manufacturing firm [2 marks]

(ii) Formulate the constraints to the objective function [4 marks]

(iii) Using a graphical method, determine the weekly production that maximizes profits and calculate the profit at this level [12 marks]

Question 5

(a) Define the following terms as used in Markov input and output analysis

(i) A state vector [2 marks]

(ii) A Markov chain [2 marks]

(iii) A transition probability matrix [2 marks]

(iv) A process diagram [2 marks]

(b) A company is considering using Markov theory to analyze brand switching among citizens between three different brands of phones. Survey data has been gathered and has been used to estimate the following transition matrix for the probability of moving between brands each month:

From	to	1	2	3
1		0.60	0.30	0.10
2		0.20	0.50	0.30
3		0.15	0.05	0.80

The current market shares for brands 1, 2 and 3 respectively are 45%, 25% and 30%.

(i) Draw a process diagram [4 marks]

(ii) Identify the parameters in the input analysis [3 marks]

(iii) Use the output analysis to determine the expected market shares after two months have elapsed [10 marks]

GOOD LUCK

END