



KABARAK

UNIVERSITY

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: FNCE 212

COURSE TITLE: MANAGEMENT MATHEMATICS II

STREAM: Y2S1

DAY: FRIDAY

TIME: 8.30 – 10.30 A.M.

DATE: 8/8/2008

INSTRUCTIONS:

1. Answer **Question ONE** and any other **two** questions
2. Show your workings clearly

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

(a) Discuss the classical and Bayesian approaches in probability. **(6mks)**

(b) Find the determinant of

$$\begin{vmatrix} 1 & 2 & 3 \\ -1 & 4 & 2 \\ 3 & 8 & 11 \end{vmatrix} \quad \textbf{(3mks)}$$

(c) At what nominal rate of interest compounded yearly, will money double in eight years? **(3mks)**

(d) Maximize the objective function $Z = 3x + y$, subject to the constraints using graphical method.

$$\begin{aligned} 2x + y &\leq 8 \\ 2x + 3y &\leq 12 \\ x &\geq 0 \\ y &\geq 0 \end{aligned} \quad \textbf{(6mks)}$$

(e) What do you understand by the following?

- (i) The decision making process **(2mks)**
- (ii) Decision making under certainty **(2mks)**
- (ii) Decision making under uncertainty **(2mks)**

(f) How many workers have a salary between 400 and 650 if the arithmetic mean is 500 and standard deviation is 100 and number of workers is 15,000 if the salary of the worker is assumed to follow the normal law?

QUESTION TWO (20 MARKS)

(a) Suppose that a building contractor has accepted order for five ranch-style, seven cape cod-style houses and 12 colonial-styled houses represented by the row vector $Q = [5,7,12]$.

If raw materials are given as:

$$\begin{array}{l} \text{Ranch} \\ \text{Cape cod} \\ \text{Colonial} \end{array} \begin{bmatrix} \text{Steel} & \text{wood} & \text{glass} & \text{paint} & \text{labor} \\ 5 & 20 & 16 & 7 & 17 \\ 7 & 18 & 12 & 9 & 21 \\ 6 & 25 & 8 & 5 & 13 \end{bmatrix} = R$$

- (i) Compute the amount of each raw material needed to fulfill his orders (QR) **(4mks)**
- (ii) Suppose steel costs Kshs.2,500 per unit, wood costs Kshs.1,200 per unit and glass, paint and labor cost Kshs.800, Kshs.150 and Kshs.1500 per unit respectively given as a column vector

$$C = \begin{bmatrix} 2500 \\ 1200 \\ 800 \\ 150 \\ 1500 \end{bmatrix}$$

Calculate the cost of each type of house (RC) **(4mks)**

- (iii) Calculate the total cost of raw materials for all the houses (QRC) **(4mks)**

- (b) An organization dealing with consumer products, wants to introduce a new product in the market. Bases on their past experience, it has a chance of 65 percent being successful and 35 percent of not being successful. In order to introduce or not, it decides to get additional information on consumers attitude towards the product. For this purpose, the organization decides on a survey. In the past, when products of this type were successful, surveys yielded favorable indications 85 percent of the time, whereas 30 percent of the time. Determine the posterior probability of the product being successful given the survey information. **(8mks)**

QUESTION THREE

- (a) The chances that a person hits a target is three out of four while the chance of another person hitting the same target is two out of three. Find the probability of the target being hit when they both try. **(4mks)**
- (b) Consider a simple trial of tossing a perfectly round and balanced coin six times. Find the probability of getting;
- (i) E_1 ; exactly three heads **(3mks)**
- (ii) E_2 ; at least three heads **(3mks)**
- (iii) Not more than two heads **(3mks)**
- (c) A trust fund for a child's education is being set up by a single payment so that at the end of 15 years there will be \$50,000. If the fund earns interest at the rate of 7% compounded semiannually, how much money should be paid into the fund? **(4mks)**

- (d) A club has 20 members, the offices of president, vice president, secretary and treasurer are to be filled and no member may serve in more than one office. How many different slates of candidates are possible? **(3mks)**

QUESTION FOUR (20 MARKS)

- (a) Using simplex method

Maximize $Z = 5x_1 + 4x_2$, subject to

$$x_1 + x_2 \leq 20$$

$$2x_1 + x_2 \leq 35$$

$$-3x_1 + x_2 \leq 12$$

$$x_1 \geq 0$$

$$x_2 \geq 0$$

(20mks)

QUESTION FIVE (20 MARKS)

- (a) What is a Markov Chain? **(3mks)**
- (b) A certain country is divided into three demographic regions. Research indicates that each year 20% of the residents in region 1 move to region 2 and 10% move to region 3 (The others remain in region 1). Of the residents in region 2, 10% move to region 1 and 10% move to region 3. Of the residents in region 3, 20% move to region 1 and 10% move to region 2.
- (i) Find the transition matrix T for this situation **(3mks)**
- (ii) Find the probability that a resident of region 1 this year is a resident of region 1 next year in two years. **(4mks)**
- (c) The number of calls arriving on an internal switchboard of an office is 90 per hour. Find the probability of 1 to 3 calls ion a minute on the board.**(5mks)**
- (d) The data on promotional status and academic qualification of another company is given below;

Promotional status	Academic qualification		Total
	DEGREE (A)	DIPLOMA (A)	
PROMOTED (B)	0.48	0.12	0.60
NON-PROMOTED (B)	0.22	0.18	0.40
TOTAL	0.70	0.30	1.00

Are academic qualifications and promotional status independent? **(5mks)**