MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF BUSINESS ADMINISTRATION

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF COMMERCE

BMS 102: MANAGEMENT MATHEMATICS 11

DATE: 23/9/2019 **TIME 11.00-1.00 PM**

INSTRUCTIONS: ATTEMPT QUESTION *ONE* AND ANY OTHER TWO

SECTION A

QUESTION ONE (COMPULSORY) 30 MARKS

a) Define the following terms as used in probability

i)Sample space

ii)Mutually exclusive events

iii)Independent events (3 marks)

b) A bag contains 4 red and 3 blue balls.2 draws are made.Find the probability that draw 1 gives 2 Red balls and draw 2 gives 2 Blue balls when the balls are replaced at draw 1 (6 marks)

c) State the characteristics of linear programming .(4 marks)

d) Using Matrix method solve the following equations:

$$x+2y+3z=210$$
$$2x+3y+2z=280$$
$$3x+3y+4z=350$$

(9 marks)

e) A decision having the following data is given

StrategiesEvents (State of nature PAY OFF(000's)			
	P1P2P3		
S1700300150			
S2500450100			
S3300300300			
Max Gain700450300			
Min. Gain300300150			

Required:

Which alternative should the manager concerned choose on the basis of the following?

i)Maximum of minimum criterion

ii)Maximum of maximum criterion

iii)Minimum of minimum criterion

iv)Minimum of maximum criterion (8 marks)

QUESTION TWO (20 MARKS)

a) Given the following technical coefficient matrix

$$A = \begin{bmatrix} 0.5 & 0 & 0.2 \\ 0.2 & 0.8 & 0.12 \\ 0.1 & 0.4 & 0 \end{bmatrix}$$

and demand $A = \begin{bmatrix} 5 \\ 3 \\ 4 \end{bmatrix}$

Determine the equilibrium output level of the industry.

(8 marks)

b) A marketing consultancy firm surveyed 600 consumers on the use of 4 brands of cooking fat i.e. Elianto, Chef, Golden Fry and Rina.190 were usingElianto, 150 – Chef, 120–Rina and the remaining Golden Fry.After a legalized marketing campaignbyh the manufacturers it was observed that out of the users of Elianto, 20 switched to Chef, 30 to Golden Fry, 10 to Rina and the remaining were brand loyal.Out of the users of Chef, 80 remained brand loyal, 25 switched to Elianto, 30 to Golden Fry and the remaining to Rina.Out of the users of Golden Fry 70 were loyal, 20 moved to Rina, 25 to Chef and the remaining to Elianto.Similarly out of Rina users 10 moved to Elianto, 18 to Chef, 12 to Golden Fry and the Remaining were brand loyal.

Required:

i) Construct a transition matrix from the given information (4 marks)
ii) If the current brand switching pattern continues, calculate the future market share of the four brands of cooking oil in the market. (8 marks)

QUESTION THREE (20 MARKS)

a) Give three advantages and three disadvantages of linear programming. (6 marks)

b) A manufacturer of mattresses produces 2 type of mattresses, A and B; requiring the same input.Inputs into the production process areman hours, machine hours and raw materials.Each unit of A requires 16 units, 8 units and 16 units of man hours, machine hours and raw materials respectively.During each week there are 640 units, 960 units and800 units of man hours, machine hours and raw materials respectively.Given that each unit of type A and B of the mattresses respectively contributessh 24 and sh 36 towards the total profit:

i)Formulate the problem as a L.P. problem (6 marks)
ii)Using graphical method, determine the optimum units of A and B to be produced. (8 marks)

QUESTION FOUR (20 MARKS)

a) Enumerate four reasons for holding inventory (4 marks)

b) Explain three costs associated with stock (6 marks)

c) Princeton Soup Company buys 90,000 containers each year from Trenton Company.The ordering cost is Ksh 90.The carrying cost per container per year is assumed to be 20% of the unit price.The discount price schedule is asgiven below:

Ordinary Quantity	Price per unit (Ksh)
1–1000	0.45
10000–20000	0.38
20000+	0.35

Assuming instantaneous delivery of goods find:

a)The EOQ

b)The Optimum TC value

c)No. of orders per year

d)Time between the orders

(10 marks)

QUESTION FIVE 20MARKS

d) An economy consists of three industries X, Y and Z and each produces one product. The interaction of the use of X, Y and Z production over some fixed period of time is as shown below:

	X	Y	Z	Final demand	Total production
X	100	40	80	140	360
Y	40	60	40	180	320
Z	60	40	40	100	240

Suppose demand is expected to increase by 30% for X and Y and reduce by the same percentage for Z industries. What must the total output be to meet this projected demand? (4 marks)

e) Highlight the assumptions of Markov analysis (8 marks)

f) A continental corporation operates a large fleet of cars for which an extensive preventive maintenance program is utilized. The cars can be classified in one of the three states: Good (G), Fair (F) and Poor (P). The transition matrix of these cars is as follows

	G	F	P
G	0.6	0.3	0.1
F	0.2	0.6	0.2
P	0.1	0.4	0.5

Assume that there are 100 cars in good shape, 60 in fair shape and 20 in poor shape

i. How many cars will be found in each condition next week? (4 marks)

ii. How many cars will be found in each condition once the process stabilizes? (4 marks)