# MURANG'A UNIVERSITY OF TECHNOLOGY

## SCHOOL OF BUSINESS & ECONOMICS

DEPARTMENT OF COMMERCE

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

**THIRD** YEAR **SECOND** SEMESTER EXAMINATION FOR, BACHELOR OF COMMERCE

AMS 333- QUANTITATIVE METHODS

DURATION: 2 HOURS

DATE: 18/4/2019

TIME: 2-4 P.M

**Instructions to candidates:**

1. Answer question One and Any Other Two questions
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

**SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION**

**QUESTION ONE (30 MARKS)**

a) Briefly describe the term probability. (2marks)

b) List and explain four environments under which decisions are made(8marks)

c) A bias coin is tossed twice. The coin is such that the tail is twice as likely as the head. Provide a probability tree diagram and hence find the probability of getting two heads. (5marks)

d) List five assumptions made under linear programming. (5marks)

e) Given the following payoff table and probability distribution for S, calculate expected monetary value(EMV) and expected opportunity loss(EOL)(10marks)

| | ACT | | | |
|---|---|---|---|---|
| State | $A_1$ | $A_2$ | $A_3$ | Probability |
| $S_1$ | 8 | 10 | 5 | $P(S_1)=0.2$ |
| $S_2$ | 15 | 12 | 10 | $P(S_2)=0.3$ |
| $S_3$ | 20 | 12 | 5 | $P(S_3)=0.1$ |
| $S_4$ | 2 | 5 | 20 | $P(S_4)=0.4$ |

**SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION**

**QUESTION TWO (20 MARKS)**

In its production process, firm A produces juice and bread. The contribution of each product is based on the accounting department is sh20.00 per litre of juice and sh30.00 per loaf of bread. Both products are processed on three machines $M_1$,$M_2$and $M_3$,the time required by each product and total time available per week on each machine is given in the table below:

| Machine | Juice | Bread | Available hrs |
|---|---|---|---|
| $M_1$ | 3 | 3 | 36 |
| $M_2$ | 5 | 2 | 50 |
| $M_3$ | 2 | 6 | 60 |

**a)** Formulate the linear programming problem in the standard way given that the manufacturer wants to maximize contribution. (4marks)

**b)** Use graphical method to solve the LP problem and advice the company on the best production mix. (6marks)

**c)** Discuss five applications of markov process. (10marks)

**QUESTION THREE (20 MARKS)**

a) Solve the following matrices through the various operations:

$A = \begin{bmatrix} 3 & 7 \\ 4 & 2 \end{bmatrix}$ $B = \begin{bmatrix} 3 & -2 \\ 7 & 6 \end{bmatrix}$ C=$\begin{bmatrix} 2 & 4 \\ 3 & 2 \\ 5 & 6 \end{bmatrix}$

i. A+B……..(2marks)
ii. B-A……..(2marks)
iii. A+C……..(2marks)
iv. C*A……(2marks)

b) Two radio stations $R_1$ and $R_2$ compete for audioship.Of those who listen to $R_1$ on a given week, 40% listen to $R_2$ the next week. In case of those who listen to $R_2$ on a given week,30%.switch over to $R_1$ the next week. This week market share of listeners is $R_1$ =60%,while $R_2$ the rest. Required:

Determine the percentage of listeners for each station:

i. Next week……(4marks)
ii. Next week but one……(3marks)
iii. In the long run……..(5marks)

**QUESTION FOUR (20 MARKS)**

a) A game is played by tossing a six sided dice twice whose two faces are painted green while the rest yellow. If you get a yellow face you lose sh30 but if you get a green face you earn sh50.using a probability tree diagram or otherwise, determine how much one should expect to earn from such a game. (6marks)

b) Define the following terms:

i. Markov analysis
ii. State probability
iii. Mutually exclusive event (6marks)

c) An agricultural economy in a developing country has three industries coffee, dairy and horticulture. The proportion of the inputs required by each industry to produce a unit of output are shown in the table below:

| | | **INPUTS** | | |
|---|---|---|---|---|
| | | Coffee | Dairy | Horticulture |
| **OUTPUTS** | Coffee | 0.1 | 0.3 | 0.2 |
| | Dairy | 0.2 | 0.3 | 0.4 |
| | Horticulture | 0.5 | 0.3 | 0.3 |

The coffee industry receives 540,000 units of primary inputs, dairy receives 400,000 units of primary inputs and horticulture receives 450,000 units of primary inputs: Required:

i The total output of each industry

ii The final demand of each industry. (8marks)