



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**THIRD YEAR FIRST SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF ARTS IN ECONOMICS WITH
INFORMATION TECHNOLOGY**

CITY CAMPUS

AEC 304: QUANTITATIVE METHODS I

Date: 7th December, 2016

Time: 2.00 - 5.00 pm

INSTRUCTIONS:

- Answer question ONE and any other TWO questions.
- Question ONE carries 30 marks and the rest 20 marks each.



QUESTION ONE (COMPULSORY)

- a) Discuss the stages involved in making a quantitative decision making process. (6 marks)
- b) Table 1 below indicates some characteristics of the first year class at junior college. A national wide survey of 10,000 middle aged men resulted in the data in the following table. This survey of 20,000 men is representative of this particular attributes for the average middle aged man in the country.

Sex	Major			Total
	Business (B)	Liberal Arts (L)	Preengineering (E)	
Male (M)	350	300	100	750
Female (F)	250	450	50	750
Total	600	750	150	1500

- i). Suppose that an analyst is going to select a student at random from this class. Show the sample space of the outcomes.
- ii). Determine for each of the following sets of events, whether they are mutually exclusive and /or collectively exhaustive:
- (a) {M, F, B, L, E}
 - (b) {B, L, E}
 - (c) {MB, ML, ME, B}
 - (d) {FB, FL, FE, B, L}
- iii). Calculate the Probability that a selected student will be a female majoring in business?
- iv). The Probability that a selected student will be a female given that she is majoring in Liberal Arts?
- v). The probability that a selected students is majoring in preengineering given that she is a female? (15 marks)
- c) Using an example differentiates between infinite sample space and finite sample space (4 marks)
- d) Discuss the advantages of quantitative methods in decision making (5 marks)

QUESTION TWO

A company owns two flour mills A and B, which have different production capacities for high, medium and low grade flour. This company has entered a contract to supply flour to a firm every week with 12, 8 and 24 quintals of high, medium and low grade respectively. It costs the company \$1,000 and \$ 800 per day to run mill A and B respectively. On a day, mill A produces 6, 2 and 4 quintals of high, medium and low grade flour respectively; mill B produces 2, 2 and 12 quintals of high, medium and low grade flour respectively.

- Formulate the above statements as a linear programming problem
- Using graphical method, calculate how many days per week each mill should be operated in order to meet the contract order economically?
- Calculate the shadow prices of the binding constraint and interpret the results. (20 marks)

QUESTION THREE

- Discuss the assumptions of Input output analysis in business (5 marks)
- Given the interindustry transaction table below;

Sector of Origin	Sector of Destination			Final Demand	Total Demand
	1	2	3		
1	20	60	10	50	140
2	50	10	80	10	150
3	40	30	20	40	130
value added	30	50	20		
Gross Production	140	150	130		

- Find the matrix of technical coefficients
 - Find the new level of total demand if in year 2 final demand is 70 in industry 1, 25 in industry 2 and 50 in industry 3 (13 marks)
- c) What is a Leontief inverse (2 marks)

QUESTION FOUR

a) ABC Company Limited is faced with four decision alternatives relating to investment in capital expansion project. Since these investments are to be made in future, the company foresees different market conditions expressed in the form of states of nature.

states of nature	Decision alternatives			
	D_1	D_2	D_3	D_4
θ_1	17%	18%	21%	19%
θ_2	15%	16%	14%	12%
θ_3	8%	9%	9%	10%

The company has no information regarding the probability of the occurrence of the three states of nature. Advise the company on the best decision alternative based on the following criteria:

- i). Maximax
 - ii). Maximin
 - iii). The Minimax Regret
 - iv). Laplace
 - v). Hurwicz (assume $\alpha = 0.7$)
- (14 marks)

b) Briefly explain the following terms as used in decision theory

- i). State of nature
 - ii). Uncertainty
 - iii). Risk
- (6 marks)