



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE
AND TECHNOLOGY**

UNIVERSITY EXAMINATION 2012/2013

**1ST YEAR 2ND SEMESTER EXAMINATION FOR THE
DEGREE OF MSC. INFORMATION SYSTEM**

KISII LEARNING CENTRE

COURSE CODE: IIS 5122

TITLE: DECISION SUPPORT METHODS

DATE: 16/4/2013

TIME: 8.00-11.00AM

DURATION: 3 HOURS

INSTRUCTIONS

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1. This paper contains FIVE (5) questions
 2. Answer question 1 (Compulsory) and ANY other 2 Questions
 3. Write all answers in the booklet provided

Question 1 – 20 Marks

- a. You want to invest \$10,000 in the stock market by buying shares in one of two companies: YU and Orange. Shares in YU, though risky, could yield a 50% return on investment during the next year. If the stock market conditions are not favorable (i.e. “bear”, market) the stock may lose 20% of its value. Orange provides safe investment with 15% return in a “bull” market and only 5% in a “bear” market. All the publications you have consulted (and there is always a flood of them at the end of the year) are predicting a 60% chance for a “Bull” market and 40% for a “Bear” market.

- i. Draw a decision tree to help you solve the market stock problem

(4 Marks)

- b. The following shows a portfolio of 7 investment options (projects). The organization has \$10,000,000 available for the total investment. Embolden the lines to mark the best selection 1, 3, 5, 6, and 7, which will cost \$9,750,000 and create a payoff of 16,175,000. All other combinations would either exceed the budget or yield a lower payoff.

Explain the following categories used in forecasting methods

- i. Simple Moving average (2 Marks)
- ii. Cumulative Moving Average (2 Marks)
- iii. Weighted moving average (2 marks)
- c. Babies are born in sparsely populated state at the rate of one birth every 12 minutes. The time between births follows an exponential distribution. Find the following;
- i. The average number of births per year (2 Marks)
- ii. The probability that no births will occur in any one day (2 Marks)
- iii. The probability of issuing 50 birth certificates in 3 hours given that 40 certificates were issued during the first 2 hours of the 3-hour period (3 Marks)

- d. There are various areas in which Management Science can be of great importance. Discuss at least four of these areas (3 Marks)

Question 2 – 20 Marks

- a. There are three ways by which Operations Research can be characterized. Explain them (6 Marks)
- b. Neon Lights on the U of A campus are replaced at the rate of 100 units per day. The physical plant orders the neon lights periodically. It costs \$100 to initiate a purchase order. A neon light kept in storage is estimated to cost about \$0.02 per day. The lead time between placing and receiving an order is 12 days. Determine the optimal inventory policy for ordering the neon lights. (6 Marks)
- c. Repair jobs arrive at a small-engine repair shop in a totally random fashion at the rate of 10 per day.
- What is the average number of jobs that are received daily at the shop (2 Marks)
 - What is the probability that no jobs will arrive during any 1 hour assuming that the shop is open 8 hours a day (2 Marks)
- d. Discuss purposes of Sensitivity Analysis (5 Marks)

Question 3 – 20 Marks

- a. Ozark Farms uses at least 800 lb of special feed daily. The special feeds is a mixture of corn and soybean meal with the following compositions:

Feedstuff	protein	Lb per lb of feedstuff	
		Fiber	cost (\$/lb)
Corn	0.09	0.02	0.30
Soybean meal	0.60	0.06	0.90

The dietary requirements of the special feed are at least 30% protein and at most 5% fiber. Ozark Farms wishes to determine the daily minimum cost feed mix.

- i. Determine the decision variables of the model (3 Marks)
- ii. Determine the objective function that minimizes the total daily cost (2 Mark)
- iii. Determine the constraints (5 Marks)
- iv. Find the optimum solution (4 Marks)

- b. The associated minimum cost of the feed mix is $z = 0.3 \times 470.59 + 0.9 \times 329.42 = \437.65 per day Product decision. To absorb some short-term excess production capacity at its Arizona plant, Special Instrument Products is considering a short manufacturing run for either of two new products, a temperature sensor or a pressure sensor. The market for each product is known if the products can be successfully developed. However, there is some chance that it will not be possible to successfully develop them. Revenue of \$1,000,000 would be realized from selling the temperature sensor and revenue of \$400,000 would be realized from selling the pressure sensor. Both of these amounts are net of production cost but do not include development cost. If development is unsuccessful for a product, then there will be no sales, and the development cost will be totally lost. Development cost would be \$100,000 for the temperature sensor and \$10,000 for the pressure sensor. Develop a decision tree for the problem. (6 Marks)

Question 4 – 20 Marks

- a. The choice of method of sensitivity analysis is typically dictated by a number of problem constraints or settings. Explain four most common ones (8 Marks)
- b. Discuss most common difficulties experienced in sensitivity analysis (6 Marks)
- c. Explain activities carried out during a simulation game training sessions
(6 Marks)

Question 5 – 20 Marks

- a. Describe Risk Analysis (2 Marks)
- b. Explain when it is appropriate to use Risk Analysis (2 Marks)
- c. Discuss steps involved by a scientist carrying out Risk Analysis (16 Marks)