

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

# **UNIVERSITY EXAMINATIONS 2014/2015**

**EXAMINATION FOR THE DEGREE OF BACHELOR OF ………………………………………….**

**HBC 2122 : OPERATIONS RESEARCH 1**

**DATE: AUGUST 2014 TIME: 2 HOURS**

**INSTRUCTIONS:**

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**QUESTION ONE [30 MARKS]**

1. Define the following terms as used in linear programming
2. Simulation [2 marks]
3. Slack variable [2 marks]
4. Surplus variable [2 marks]
5. Feasible solution [2 marks]
6. Constraints [2 marks]
7. Given 

Subject to:





Find the maximizing dual problem [6 marks]

1. State and define any two types of models in operations research [2 marks]
2. Explain any four advantages and four disadvantages of simulations [8 marks]

**QUESTION TWO**

1. Explain the limitations of operations research [6 marks]
2. A farmer has 100 ha of farm and wishes to plant maize and potatoes in his farm. He has a capital of $5,400. One ha of maize costs $60 to cultivate. He has a work force of 320 labourers and it takes 4 bobourers to cultivate an ha of maize and 8 labourers to cultivate a ha of potatoes. He wishes to maximize the profit he gets from his farm. Suppose that he gets a profit of $60 from an ha of maize and $120 from a ha of potatoes. Using the graphical method, advice the customer how to manage his farm in order to obtain maximum profit. [14 marks]

**QUESTION THREE [20 MARKS]**

1. Explain the phases in operations research. [4 marks]
2. A farmer owns 100 acres of farm and plan to plant at most three crops. The seed for crop A , B and C cost $40, $20 and $20 per acre respectively and there is a maximum of 160 work days available. If the farmer can make a profit of $100 per acre on crop A, $300 on B and $200 on crop C, how many acres of each crop should the farmer plant so as to maximize profit. Use simplex method. [12 marks]

**QUESTION FOUR [20 MARKS]**

1. A concrete company transports concrete from there plants to three factories and the cost of transporting one concrete from each plant to each site is as shown below in pounds per ton.

Using the table above, find the initial solution and estimate the total cost using

1. North-west corner method [10 marks]
2. Vogel Approximation method [10 marks]