

 W1-2-60-1-6

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2013/2014**

**EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE/ BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

**HBC 2122: OPERATIONS RESEARCH**

**DATE: DECEMBER 2013 TIME: 2 HOURS**

**QUESTION ONE**

1. Define and explain the following operations research terminologies citing relevant examples where possible:
2. Service discipline [2 marks]
3. Economic order quantity [2 marks]
4. Dummy destination [2 marks]
5. Slack variable [2 marks]
6. Miximin-minimax principle [3 marks]
7. What is degeneracy in transportation problem? How is it resolved? [4 marks]
8. State any TWO advantages and any TWO disadvantages of having inventories for an organization [4 marks]
9. Identify FIVE reasons why management scientist would consider employing simulation technique to solve management problems [5 marks]
10. Consider a game having the following payoff matrix.

 Play B

 B1 B2 B3 B4 B5

 A1 3 -1 4 6 7

Player A A2 -1 8 2 4 12

 A3 16 8 6 14 12

 A4 1 11 -4 2 1

1. Determine whether the game has a saddle point. If it does, determine the optimum strategy for each player. [3 marks]
2. Find the value of the game. Is the game fair? [3 marks]

**QUESTION TWO**

1. ‘The assignment problem is a type of allocation problems’. In light of this statement:
2. What do you understand by an assignment problem? [1 mark]
3. Explain ONE technique for solving such problems, illustrate your answer by means of a simple example. [
4. Consider the following problem of assigning FIVE jobs to five persons. The assignment costs are given as follows:

 Job

 1 2 3 4 5

 A 8 4 2 6 1

Person B 0 9 5 5 4

 C 3 8 9 2 6

 D 4 3 1 0 3

 E 9 5 8 9 5

 Determine the optimum assignment schedule and minimum in light cost. [10 marks]

**QUESTION THREE**

1. Find the critical path of the following network using EST/LSTs.

Activity Preceding Activity Duration

1 - 4

2 1 7

3 1 5

4 1 6

5 2 2

6 3 3

7 5 5

8 2,6 11

9 7.8 7

10 3 4

11 4 3

12 9,10,11 4 [7 marks]

1. Delicious bread keeps stock of a popular brands of cake. Previous experience indicates the daily demand as given here:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Daily demand | 0 | 10 | 20 | 30 | 40 | 50 |
| Probability | .01 | 0.20 | 0.15 | 0.50 | 0.12 | 0.02 |

Consider the following sequence of random numbers:

 48, 78,19,51,56,77,15,14,68,09

Using this sequence simulate the demand for the next 10 days. Find out the stock situation if the owner of the bakery decides to make 30 cakes every day. Also estimate the daily average demand for the cakes on the basis of simulated date. [8 marks]

**QUESTION FOUR**

Reliable transport company Ltd. id to move goods from three factories located in Nairobi, Mombasa and Thika to three distribution centers in Nairobi, Machakos and Nyeri. Information about the movement is given below:

Supply Source Demand destination

Nairobi 10 Nairobi 20

Mombasa 15 Machakos 15

Thika 40 Nyeri 30

The transportation costs in shillings per unit are

 Nairobi Machakos Nyeri

 Nairobi 2 2 3

 Mombasa 4 1 2

 Thika 1 3 1

1. Determine the initial basic feasible solution using:
2. Least cost method [3 marks]
3. North West corner method [3 marks]
4. Vogel approximation method [3 marks]
5. Test for the optimality of a(i) above