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

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

# University Examinations 2016/2017

**YEAR II SEMESTER II EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE**

# HBC 2210: OPERATIONS RESEARCH I

**DATE: JULY, 2017**  **TIME: 2 HOURS**

**INSTRUCTIONS: Answer Question ONE and Any Other TWO Questions.**

**Question One – 30 Marks**

a) Define the term operations research. [4 marks]

b) Discuss essential characteristics of operations research. [4 marks]

c) Discuss any six types of mathematical models applied in operation research. [6 marks]

d) Give history of operations research. [6 marks]

e) Define the following terms as used in operations research. [6 marks]

1. Objective functions
2. Constraints
3. Optimal solution [6 marks]

f) Discuss any four characteristics of a linear programming problem in operations research. [4 marks]

**Question Two – 20 Marks**

a) Minimize 120x1+160x2  [10 marks]

subject:







b) An industry is manufacturing two types of products P1 and P2. The profits per kg of the two products are ksh. 30 and ksh. 40 respectively. These two products require processing in three types of machines. The following table shows the available machine hours per day and the time required on each machine to produce one kg of P1 and P2. Formulate the problem in the form of linear programming model. [10 marks]

|  |  |  |  |
| --- | --- | --- | --- |
| Profit/Kg | P1 ksh. 30 | P2 Ksh. 40 | Total available machine hours/day |
| Machine 1 | 3 | 2 | 600 |
| Machine 2 | 3 | 5 | 800 |
| Machine 3 | 5 | 6 | 11000 |

**Question Three – 20 Marks**

A furniture maker keeps goods in three deports x,y,z. four wholesales need his products at their industry. The following table shows transport cost per cabinet from various deports to the respective customers.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Deport | A | B | C | D | Availability |
| X | 26 | 22 | 30 | 40 | 6 |
| Y | 34 | 28 | 24 | 26 | 18 |
| Z | 36 | 36 | 30 | 24 | 21 |
| Demand | 9 | 9 | 12 | 15 |  |

Required:

Compute the initial minimum cost using least cost method. [10 marks]

b) Consider the transportation problem presented in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Origin | Distribution | | | | Supply |
| 1 | 2 | 3 |  |
| 1 | 2 | 7 | 4 |  | 5 |
| 2 | 3 | 3 | 1 |  | 8 |
| 3 | 5 | 4 | 7 |  | 7 |
| 4 | 1 | 6 | 2 |  | 14 |
| Demand | 7 | 9 | 18 |  |  |

Required:

Find an initial basic feasible solution for the transportation problem using least cost method. [10 marks]

**Question Four – 20 Marks**

a) Consider the transportation problem presented in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factors | Distributors | | | Supply | | |
| W1 | W2 | W3 | |  |
| 1 | 16 | 20 | 12 | | 200 |
| 2 | 14 | 8 | 18 | | 160 |
| 3 | 26 | 24 | 16 | | 90 |
| Demand | 180 | 120 | 150 | | 450 |

Required:

Find the initial basic feasible solution using the matrix minimum method. [10 marks]

10 Marks (1 mark) (1 mark)

10 Marks (4marks) (4marks) (4marks) (7 marks)

(10 Marks)

(1mark)

(1mark)

(1mark)

(1mark)

(4 marks)

(4 marks)

(4 marks)