

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

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

# **UNIVERSITY EXAMINATIONS 2014/2015**

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

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

**SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF DEVELOPMENT STUDIES**

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF BMCS**

**HBC 2122 : OPERATIONS RESEARCH I**

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

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

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**QUESTION ONE [COMPULSORY][30 MARKS]**

1. Discuss briefly the steps applied in the methodology of operations research. [7 marks]
2. Briefly explain the basic operations research concepts. [4 marks]
3. Explain the characteristics of a linear programming problem.[7 marks]
4. Explain the various steps involved in solving a transportation problem using the minimum cost method. [4 marks]
5. What do you understand by the unbalanced transportation problem? How do you start in this case
6. How does network analysis help in project management [4 marks]

**QUESTION TWO [20 MARKS]**

1. Integrated metal works deals with all metal works. It generally does jobs on contract basis. At present it uses four jobs, A, B, C and D in hand. Integral has four machines. However, the costs for performing a job on different machines very because of the capacity of the machine and the characteristics of the job. The jobs are to be exclusively performed on one machine as the set up costs are too prohibitive to permit setting up of another machine for the same job. An estimate has been made of the cost of performing the jobs on each machine and the estimated cost data (in ksh) is tabulated below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Machine  Jobs | 1 | 2 | 3 | 4 |
| A | 20 | 36 | 31 | 17 |
| B | 24 | 32 | 40 | 12 |
| C | 22 | 40 | 38 | 18 |
| D | 36 | 39 | 35 | 18 |

Required:

1. Assign the jobs to various machines so as to minimize the cost. Find the minimum cost [15 marks]
2. Discuss the elements of the queuing system [5 marks]

**QUESTION THREE [20 MARKS]**

A company has three warehouses A, B, C and four stores W, X, T and Z. The

warehouse have altogether a surplus of 150 units of a given commodity as follows.

A 50

B 60

C 40

The four store together need also 150 units of the commodity as follows

W 20

X 70

Y 50

Z 10

Costs of shipping of one unit of commodity in Kenya shillings form warehouse i

To store j are as follows

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| store  warehouse | w | x | y | z |
| A | 50 | 150 | 70 | 60 |
| B | 80 | 70 | 90 | 10 |
| C | 15 | 87 | 79 | 81 |

Required:

Schedule the transport to minimize the cost of transportation using Vogel’s approximation method. Also find out the minimum possible transportation cost s for the given problem. [20 marks]

**QUESTION FOUR [20 MARKS]**

1. A firm decides to undertake one or more of 4 projects A, B, C, and D. It requires finance for the projects. Four banks W, X, Y and Z are willing to finance the projects. The table below gives the interest rates that would be charged for different projects.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Projects | | | | |  |
|  | | | | |  |
| Banks | A | B | C | D | Maximum Credit |
| W | 16% | 18% | 19% | 17% | 30 000 |
| X | 18 | 19 | 19 | 18 | 20 000 |
| Y | 16 | 17 | 18 | 18 | 10 000 |
| Z | 15 | 17 | 20 | 19 | 20 000 |
| Amount required | 40 000 | 20 000 | 20 000 | 20 000 |  |

**Required:**

Which projects should the firm undertake and how should the firm schedule the

loans so that the total interest paid by the firm is minimized. [10 marks]

1. A certain type of machines break-down at an average rate of 5 per hour. The breakdowns are in accordance of passion process. Cost of idle machine hour comes to kshs. 15 per hour. Two repair men A and B have been interviewed. A charges kshs. 8 per hour and he services break-down machines at the rate of 7 per hour. Whereas B charges ksh. 10 per hour and he services the said machines at an average rate of 9 per hour. Which repair mans services should be used and why? (assume the work shift is 8 hours).

[10 marks]