

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE  
OF BACHELOR OF SCIENCE IN ECONOMICS

ECON 434: OPERATIONS RESEARCH

STREAMS: BSC (ECON)

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 06/12/2017

11.30 A.M. – 1.30 P.M.

**INSTRUCTIONS:**

**QUESTION ONE**

- (a) Today life has become more and more complex and therefore operation research is required to assist in decision making to arrive at the optimal solution
- (i) Name the characteristics of the operations research. [5 marks]
  - (ii) Discuss the phases of operational research. [5 marks]
- (b) Modeling enables operational research in providing a clear structural framework to the problem for the purpose of understanding and dealing with the reality, why do you think is slow implementation of these operation research models. [10 marks]
- (c) An institution has six workers to assign different jobs, the time that each worker will take to complex the particular job is as shown in the following table

		Jobs				
Worker		A	B	C	D	E
1		6	2	5	3	6
2		2	5	8	7	7
3		7	8	6	9	8
4		6	2	3	4	5
5		9	3	8	9	7
6		4	7	4	6	8

Assign the operators to different jobs to minimize the time. [10 marks]

**QUESTION TWO**

A factory has assembled personal computers through the following inter-linked activities

A	-	4
B	-	3
C	A	7
D	A	6
E	B, C	5
F	B	2
G	B	8
H	G	3
I	D	4
J	DEF	1
K	JIH	2

**Required:**

- (i) Draw a network diagram for the project. [5 marks]
- (ii) Determine the earliest start, earliest finish, latest start and the latest finish time for all the activities. [5 marks]
- (iii) Determine the critical path and the assembly duration. [4 marks]
- (iv) Calculate total float, free float and independent float for all the activities. [6 marks]

**QUESTION THREE**

- (a) Highlight the reasons why organizations keep inventories. [10 marks]
- (b) The following data relates to a particular stock item

Normal usage 220 per day  
Minimum usage 100 items per day  
Maximum usage 280 per day  
Lead time 25 – 30 days  
Economic order quantity 500

**Required:**

- (i) Calculate the various control levels [6 marks]
- (ii) Outline the requirements of a linear programming [10 marks]

**QUESTION FOUR**

(a) Explain the assumptions of linear programming. [10 marks]

(b) A company manufactures 2 types of biscuits i.e. Marie and Gluco. Marie is sold for 200 box with 20% profit of 40 and gluco sales for 300 box with 10% profit of 30. The biscuits are processed in 3 main departments: Blending, cooking and packing. The average time taken in minper box for each operation is as follows:

	Blending	Cooking	Packing	Total profit
Marie	1	3	3	40
Gluco	2	2	1	30
Total hrs	600	1200	900	

The blending equipment is available for a maximum of 10 hrs, cooking capacity is available for 20 hrs and packing department is available for 15 hrs.

(i) Draft the linear programming formulation to find the number of boxes of each type of biscuit that the company may manufacture to maximize profit.[5 marks]

(ii) Solve the problem. [5 marks]

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