

**CHUKA**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF STATISTICS AND SOCIOLOGY, BACHELOR OF STATISTICS AND ECONOMICS AND STATISTICS AND MATHEMATICS**

**ECON 431/ECON 438: OPERATIONS RESEARCH**

**STREAMS: Y4S2**

**TIME: 2 HOURS**

**DAY/DATE: FRIDAY 06/12/2019**

**11.30 A.M. – 1.30 P.M.**

**INSTRUCTIONS:**

- Q1. (a) Discuss the steps that are followed when solving operations research problems. (10 marks)
- (b) What are the limitations of using operations research techniques to solve business problems? (10 marks)
- (c) Kuchapa secretarial Bureau Ltd has five typists. The company has received several proposal reports for typing. The average time in minutes that each typist takes to type a report is a shown in the table below

		Reports				
		I	II	III	IV	V
Typist A		80	140	150	80	120
B		100	150	140	110	120
C		120	140	170	110	140
D		100	110	150	110	150
E		140	170	200	130	170

Each typist is assigned only one report to type at a time

**Required**

Determine the optimal assignment that will minimize the total time of typing the reports. (10 marks)

Q2. (a) Discuss the assumptions made in calculating the economic order quantity. (8 marks)

(b) The following information relates to the usage of an important material in a manufacturing company;

Maximum consumption per day	40,000 units
Normal consumption	28,000 units
Minimum consumption	16,000 units
Reorder quantity	80,000 units
Reorder period	4 – 8 days

Calculate

(i) The reorder level (3 marks)

(ii) The maximum stock level (3 marks)

(iii) Minimum stock level (3 marks)

(iv) Average stock level (3 marks)

3. (a) State the differences between the Critical Path Method (CPM) and program evaluation and review techniques (PERT) of project management. (8 marks)

(b) Utenzi contractors has identified the following activities for a project to start soon:

Activity	Preceding Activity	Activity Duration in Weeks
A	-	3
B	-	2
C	A	7
D	A	1
E	B	4
F	B	5
G	D, E	4
H	D, E	6
I	F	3
J	C, G	5
K	C, G	3
L	H, J	4
M	I	2
N	K, L	5

**Required**

- (i) Draw a network diagram for the project. (6 marks)
  - (ii) Determine the critical path and project duration. (2 marks)
  - (c) Give two reasons that may necessitate crashing of a project (reducing the project duration). (2 marks)
4. (a) Using suitable examples, distinguish between corporative and non-cooperative games. (7 marks)
- (b) A company manufactures two products A and B. The cost of producing one unit of product A and product B is Ksh 60 and Ksh 80 respectively. The company has a contract of supply at least 200 units of product B to its regular customers. One unit of product A requires one machine hour whereas product B has machine hours available for product A are 400 hours. One unit of each product A and B requires one hour of labour and a total of 500 labour hours are available.

**Required**

- (i) Formulate the problem as a linear programming problem. (6 marks)
  - (ii) Write the problem in (i) above in standard form. (3 marks)
  - (c) Give four limitations of using linear programming technique to solve business problems. (4 marks)
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