



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING Y5S2

EMG 2518: OPERATIONS RESEARCH

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Pick Date Sep 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of Choose No questions. Attempt Choose instruction.

Do not write on the question paper.

Question ONE

Mariakani Enterprises produces two products, Klunk and Klick. Klunk has a contribution of Ksh.3 per unit and Klick Ksh.4 per unit. The production data are as follows:

	Per unit		
	Machining (Hours)	Labour (Hours)	Material (Kgs)
Klunk	4	4	1
Klick	2	6	1
Total available per week	100	180	40

Because of a trade agreement, sales of Klunk are limited to a weekly maximum of 20 units and to honour an agreement with an old established customer at least 10 units of Klick must be sold per week.

Required: As a Production Manager of Mariakani Enterprises establish a weekly production plan that maximises contribution. Use graphical method. (20 Marks)

Question TWO

- (a) Explain the limitations of operations research (6 marks)
- (b) Inventory is a passive investment by the organization and may represent an amount that would otherwise be used to generate profits. Explain reasons for holding stocks. (14 marks)

Question THREE

A firm has three factories in Lagos, Ibadan and Benin which make weekly dispatches to four depots located at Kaduna, Kano, Kebbi and Katsina. The transport cost of goods dispatched along each route is shown in the table below as well as the weekly quantities available from each factory and the requirement of each depot.

Transport cost / create

Storage	Demand point				Supply capacity
	Kaduna	Kano	Kebbi	Katsina	
Lagos	5	4	5	6	100
Ibadan	3	3	6	6	200
Benin	2	5	7	8	400
Demand	200	100	150	250	

Required: Allocate the products to the depots using (i) the Northwest corner method and (ii) Least cost method, for initial feasible solution. (20 Marks)

Question FOUR

The following information is available for a project of building a boat

Activity	Preceding activity	Activity description	Activity Duration (days)
A	-	Designing Hull	9

B	-	Prepare boat shed	3
C	A	Design Mast and Mast mount	8
D	A	Obtain Hull	2
E	A	Design sails	3
F	C	Obtain Mast Mount	2
G	C	Obtain mast	6
H	C	Design Rigging	1
J	B, D	Prepare Hull	4
K	F, J	Fit Mast Mount to Hull	1
L	E, H, G, K	Step Mast	2
M	E, H	Obtain Sails and Rigging	3
N	L, M	Fit Sails and Rigging	4

Required:

- Draw the project network indicating the earliest start times and latest start times
- Determine the critical path and the project completion time
- Calculate the total float for the non- critical activities (20 Marks)

Question FIVE

Discuss the applications and limitations of queuing theory (20 Marks)