TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Business & Social Studies

DEPARTMENT OF MANAGEMENT SCIENCE

DIPLOMA IN PROCUREMENT AND MATERIALS MANAGEMENT
DIPLOMA IN LOGISTICS AND TRANSPORT MANAGEMENT
DIPLOMA IN HUMAN RESOURCES MANAGEMENT
DIPLOMA IN BUSINESS ADMINSTRATION
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN ACCOUNTANCY
DIPLOMA IN FRONT OFFICE

BAC 2202 : QUANTITATIVE TECHNIQUES

END OF SEMISTER EXAMINATIONS

SERIES: APRIL/MAY 2016

TIME: 2HOURS

INSTRUCTIONS

This paper contains **FIVE** questions .Answer question
ONE(COMPULSORY) and any other **TWO** questions

1a)State **FIVE** essential features of quantitative methods.(5marks)

b) Amina buys a water pump for ksh. 60500, which is expected to last for 10yrs and have a scrap value of 7500. If depreciation is on straight-line method how much should be provided for each yr? (5marks)

c)solve the following simultaneous equations using inverse method

$$4x-2y+z=9$$

$$8x+3y-2z=13$$

$$-2x+5y+3z=14 \quad .(10marks)$$

d)find the derivatives of the following functions

(i) $y=3x^4 -10x^2+4x^3+15$ (3marks)

(ii) $\int 10x^4-4x^3+2x-10$ (2marks)

e)A firm produces two products x and y with a contribution of ksh.80 and 100 respectively. Production data are as follows per unit

	Labour hrs	Material A	Material B
X	3	4	6
Y	5	2	8
Total available	500	350	800

Formulate the linear program into a standardised manner .(5marks)

2a)Abc ltd as a result of past experience estimates that the weekly production costs and revenues are as follows-; $C=100+23q+1/2q^2$ and $R=100q-q^2$ (x<100) where c is the total costs R is the total revenue and q is the quantity produced/sold

Required find;

(i) the quantity that maximizes total revenue (2marks)
(ii) maximum total revenue (2marks)
(iii) the quantity that maximizes profit (4marks)
(iv) maximum profit (2marks)

b)A company employs service engineers based at various locations throughout the country to service and repair their equipment installed in customers' premises. Four requests for services have been received and the company finds that four

engineers are available. The distance each of the engineers is from the various customers is given in the following table and the company wishes to assign engineers to customers to minimize the total distance to be travelled.

engineers	Customers X	W	y	Z
Avis	25	18	23	14
Bill	38	15	53	23
Chally	15	17	41	30
Dave	26	28	36	29

 Required to assign each engineer to a customer's so as to minimize the total
        distance to be   travelled.(10marks)

3a)Office equipment suppliers have three depots allocated in different towns. It receives orders for 15 cabinets from four customers. The capacities for depot x, y and z are2, 6and 7 respectively while demands for customers a, b, c and d are 3, 3, 4 and 5respectively. The detail for transport costs per cabinet is as follows

	Customer a	Customer b	Customer c	Customer d
Depot x	13	11	15	20
Depot y	17	14	12	13
Depot z	18	18	15	12

Using any method find the optimal solution which minimizes   transportation cost
        (15marks)

b) State **FIVE** characteristics of a transportation model (5marks)

4. Kappa ltd can produce three products A, B and C. The products yield a
        contribution of   kshs. 8 , 5 and 10 respectively. The products use a machine
        which has 400hours capacity each product using 2, 3 and 1 machine hours
        respectively.150 units of a special component are used by products A and C.
        Products A and C uses 2kgs and 4kgs of alloy respectively which only 200kgs
        are available. A trade agreement restricts product B to no more than 50 units.
        The firm wishes to maximize contribution

REQUIRED
(i) formulate the lp in the standardized format (5marks)

(ii)solve using the simplex

 method (15marks)

5a) The following is a network program for a project

Activity	Preceding	Duration [Weeks]
A	-	3
B	A	5
C	A	4
D	A	4
E	B	2
F	B	4
G	E	6
H	F	3
J	C,F	8
K	D	7
L	G,H	4
M	J,K,L	5

REQUIRED

(i) Draw a network diagram. (7marks)

(ii) Find the critical path. (3marks)

5b) coast bus has two main branches that manage offices throughout Kenya. Mombasa branch controls coastal offices while Nairobi manages the upcountry offices. Each office has cashiers ,mechanics and drivers as show below

Type of office

	large	medium	small
cashiers	4	2	1
mechanics	12	6	3
drivers	6	4	2

The number of offices are-;

	Nairobi	Mombasa
large	3	7
medium	5	8

small   12   4

REQUIRED;

Find the number of various kinds of staff employed in Nairobi and Mombasa.
   (10marks)