UNIVERSITY
OF
JOHANNESBURG

FACULTY/COLLEGE	College of Business and Economics
SCHOOL	Johannesburg Business School
DEPARTMENT	Transport and Supply Chain
CAMPUS(ES)	APB
MODULE NAME	Quantitative Techniques
MODULE CODE	QAN01B1 / PMT42AF /PML44A4
SEMESTER	Second
ASSESSMENT OPPORTUNITY, MONTH AND YEAR	Supplementary Assessment Opportunity January 2020

ASSESSMENT DATE	January 2020	SESSION	08:30 – 11:30
ASSESSOR(S)	Mr Laby ILumbe		
MODERATOR(S)	Ms. Juanita van der Walt (Internal) Prof. R. Chinomona (External)		
DURATION	3 hours (180 min)	TOTAL MARKS	125

NUMBER OF PAGES OF QUESTION PAPER (Including cover page)	5

INFORMATION / INSTRUCTIONS:
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- This is a closed-book assessment.
- Question papers must be handed in together with your answer books.
- Answer all the questions in the answer book
- Answer each question in a separate page.
- Read the questions carefully and answer only what is required.
- Number your answers clearly and correctly as per the question paper.
- Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.
- Structure your answers by using appropriate headings and subheadings.
- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.
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QUESTION 1 [10 MARKS]

In many cases different types of cost determination used in developing a quantitative analysis model. Match Column A with Column B

Column A	Column B
1.1 Fixed cost	**a.** local delivery (transport)
	b. direct labours
	c. communication cost (invoicing)
	d. salary of the CEO
	e. inventory carrying
1.2 Variable cost	**f.** constant distribution cost
	g. reverse logistics (returning goods)
	h. Telkom telephone contract
	i. information system cost (tracking and tracing)
	j. rent a facility (depot, warehouse)

QUESTION 2 [10 MARKS]

Didi Stone is considering opening new warehouses in Durban, Edenvale or Florida where high-quality stocks will be stored. She has assembled the following fixed and variable costs

Location	Fixed Cost per Year	Per-Unit Costs		
		Material	Variable Labour	Overhead
Durban	R200000	R0.20	R0.40	R0.40
Edenvale	R180000	R0.25	R0.75	R0.75
Florida	R170000	R1.00	R1.00	R1.00

What is the crossover point units between **Edenvale** and **Florida** total cost lines? (9)

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QUESTION 3 [10 MARKS]

Raby is a manufacturing companies that manufactures circuit breakers for Eskom. It has four plants in South Africa i.e. Vereeniging, Rustenburg, Nigel and Bloemfontein. The company is able to produce the following numbers of Circuit Breakers per month:

Plant	Production
1. Vereeniging	5
2. Rustenburg	25
3. Nigel	20
4. Bloemfontein	25

Eskom purchase the following numbers of Circuit Breakers for their plants in three cities:

Firm:	Demand:
A. Bethlehem	10
B. Phalaborwa	20
C. Secunda	15

The transportation costs of circuit breakers (Rands) from sources to destinations are shown in the following table. Formulate this as a linear programming model (10)

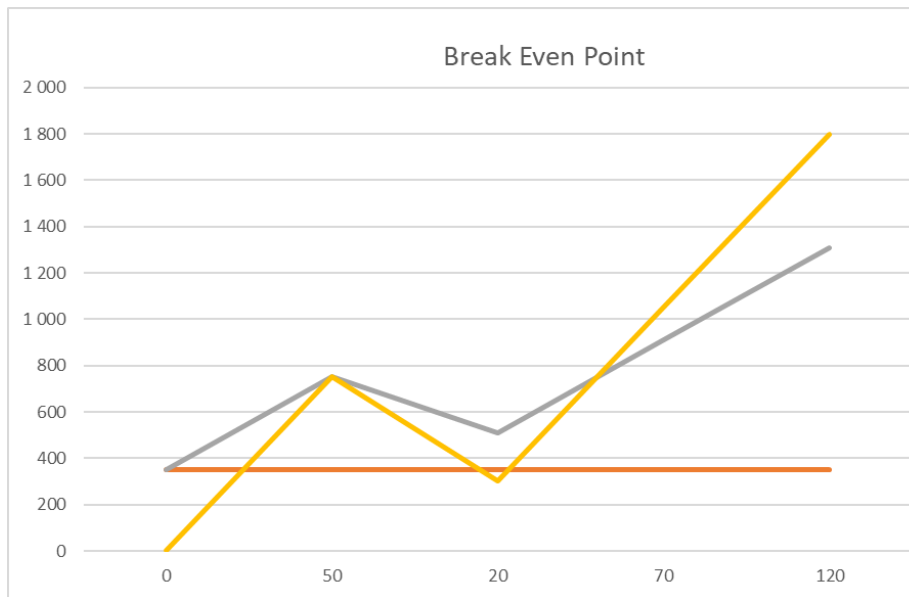| From	A	B	C
1	7	8	5
2	6	10	6
3	10	4	5
4	3	9	11

QUESTION 4 [15 MARKS]

Fifty employees are grouped according to their contract type: Permanent, Part-time, Year contract and Project-basis respectively. The result is shown in the table below.

Contract type	Frequency
Permanent	double of project basis
Part-time	15
Year contract	A quadruple of project basis
Project basis	A third of part time employees

4.1 What is the probability of getting an employee with a year contract? (4)

4.2 What is the probability of getting an employee with a permanent contract? (4)

4.3 What is the probability of getting an employee with a project basis contract? (4)

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QUESTION 5 [10 MARKS]

From the graph above answer the following question:

5.1 The parallel line to the X axis is known as_____ (2)

5.2 How many items must the company sell to break even? (2)

5.3 What is the total revenue at this break even, assume that the selling price is at 20 each item and variable cost at 18? (2)

5.4 If the company sells 20 units, what will be the profit? The cost of using the equipment is R350. The materials used for one-unit cost R8, and the company can sell these units for R15 each. (2)

5.5 Refers to 5.4, what will be the profit? If the cost of using the equipment has declined by 71%. The materials used for one-unit cost R8, and the company can sell these units for R15 each. (2)

QUESTION 6 [30 MARKS]

Develop a 3-month moving average forecast for Pretty Lerato's Garden Supply and compute the MAD. Compare the moving average with an exponential smoothing of $\alpha= 0.4$ and decide on the most appropriate forecast method to consider.

Month	Demand
February	520
March	490
April	550
May	580
June	600
July	420
August	510
September	610

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QUESTION 7 [15 MARKS]

Orders for clothing from a particular manufacturer for this year's Christmas shopping season must be placed in February. The cost per unit for a particular dress is R20 while the anticipated selling price is R50. Demand is projected to be 50, 60, or 70 units. There is a 40 percent chance that demand will be 50 units, a 50 percent chance that demand will be 60 units, and a 10 percent chance that demand will be 70 units. The company believes that any leftover goods will have to be scrapped. How many units should be ordered in February?

| | States of Nature | | |
| | Demand (units) | | |
Alternatives	50	60	70
Order 50	1500	1500	1500
Order 60	1300	1800	1800
Order 70	1100	1600	2100

QUESTION 8 [25 MARKS]

Even though independent gasoline stations have been having a difficult time, Lira has been thinking about starting her own independent gasoline station. Lira's problem is to decide how large the station should be. The annual returns will depend on both the size of her station and number of marketing factors related to the oil industry and demand for gasoline. After a careful analysis, Melisa developed the following table:

SIZE OF FIRST STATION	GOOD MARKET (R)	FAIR MARKET (R)	POOR MARKET (R)
Small	50,000	20,000	-10,000
Medium	80,000	30,000	-20,000
Large	100,000	30,000	-40,000
Very large	300,000	25,000	-160,000

For example, if Lira constructs a small station and the market is good, she will realize a profit of R50,000. Determine the best alternative using the following decision criteria:

(a) Maximax (5)
(b) Maximin (5)
(c) Equal Likelihood (5)
(d) Criterion of realism with a 0.6 coefficient of realism (α). (HINT: the decision maker is an optimist) (10)

END OF ASSESSMENT – GOOD LUCK ☺

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TOTAL: 125 MARKS

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