



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMMERCE, HUMAN SCIENCE AND EDUCATION
DEPARTMENT OF MARKETING, LOGISTICS AND SPORTS MANAGEMENT**

QUALIFICATION: BACHELOR OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT	
QUALIFICATION CODE: 07BLSC	LEVEL: 6
COURSE CODE: FDA621S	COURSE NAME: FORECASTING AND DATA ANALYSIS
SESSION: NOVEMBER 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
<ol style="list-style-type: none">1. This paper consists of 2 Sections, A and B2. Answer <u>ALL 5</u> questions in all sections3. Read each question carefully4. Write as legible and precise as possible5. Indicate your class lecturer's name on your answer sheet

THIS EXAMINATION QUESTION PAPER CONSISTS OF 8 PAGES (Including this front page)

SECTION A

[30 MARKS]

QUESTION 1: MULTIPLE CHOICE

[20 MARKS]

There are ten multiple-choice questions with several possible choices; choose the best possible answer, e.g. 1.1 A. Each question is worth two marks.

1. Forecasts used for new product planning, capital expenditures, facility location or expansion, and R&D typically utilise a
a) short-range time horizon
b) medium-range time horizon
c) long-range time horizon
d) naive method because there is no data history

2. Multiple regression analysis is used when [2 marks]
a) there is insufficient data to carry out simple linear regression analysis.
b) the dependent variable depends on more than one independent variable.
c) one or more assumptions of simple linear regression are incorrect.
d) a linear function cannot describe the relationship between the dependent and independent variables.

3. Which of the following is suitable for launching a new product? [2 marks]
a) Moving average
b) Product life cycle analysis
c) Exponential smoothing
d) all of the above

4. Which of the below is an inherent assumption of forecasting? [2 marks]
a) Forecasting tends to be more accurate for longer periods than nearer periods
b) Forecast is accurate
c) Forecast is never accurate
d) All of the above

5. When you over-forecast, you will most likely [2 marks]
a) High inventory cost
b) Low inventory cost
c) High shipping cost
d) Low obsolescence

6. Which of the below is true [2 marks]
a) In forecasting, data analytics must consist of data from internal sources only
b) Product improvement is not regarded as a new product in forecasting as historical data of the older version is used
c) The unconstrained forecast is a forecast constrained by the operations side of the business, such as capacity, materials, cash flow, etc
d) Before-after retail simulation overstate the true market potential thus forecaster must discount results

7. Which of the below is false? [2 marks]
- a) Data analysis and prediction require collaboration between different departments.
 - b) Some forecasting models require more data than others.
 - c) Constraint forecasting doesn't consider the available capacity constraint
 - d) Unconstraint forecast is based on the actual market demand potential
8. A repeatable pattern of increases or decreases in demand, depending on periods of one year or less, is a time series pattern called: [2 marks]
- a) Trend
 - b) Seasonality
 - c) Cycles
 - d) Random variations
9. Which of the below techniques requires multiple experts interviewed together to reach a consensus? [2 marks]
- a) Expert Opinion
 - b) Panel Consensus
 - c) Delphi Technique
 - d) All of the above
10. Mature products with stable demand [2 marks]
- a) Are usually easiest to forecast.
 - b) They Are usually the hardest to forecast.
 - c) Cannot be forecast.
 - d) Do not need to be forecast.

QUESTION 2: MATCH**[10 MARKS]**

Match the below scenarios to a technique. Each question is worth two marks.

Scenario	Technique
1. Nivea has introduced a new deodorant in Namibia; they opted to use similar deodorants from past sales data presented in Namibia to predict demand	a) awareness-trial-repeat purchase model
2. Audi uses a real-world experiment by introducing their latest car in Berlin and uses the opportunity to work the “bugs” out of the new product	b) Historical review c) Traditional
3. Simba introduced new flavoured chips and created a virtual reality shop where they ask consumers to buy brands as they usually would buy with the new flavour missing and again asked to do the same with the new flavour part of the virtual reality.	d) Test market
4. Coca-Cola created a database to record historical patterns for a new Fanta apple flavour they had just introduced. The database tracks trial rates, repeat purchase rates, purchase cycles, and by-product size categories. Then a mathematical model is applied that combines all of this into predicting a trial curve and a repeat purchase curve, which yields a year-one forecast of sales or retail depletions	e) Before-after retail simulation
5. The new Mac makes up foundation is given to a chosen user for an in-home usage product test under normal conditions for weeks. The product test results predict the repeat purchase curve and the purchase cycle.	f) Normative approach

Section A subtotal: 30 marks

SECTION B: STRUCTURED QUESTIONS**[70 MARKS]****QUESTION 3****[5 MARKS]**

You are invited to an interview for a demand planner position. The interviewer asks you what the qualities of a successful demand planner are. What is your response?

QUESTION 4**[46 MARKS]**

Namibia breweries hire you as their demand planner. Part of your job is to provide forecasts to suppliers and the production department for planning purposes. Below is your last 12 months' demand with the average price per unit.

Period	Product price (NAD)	product A sales
Nov-21	10.00	2449
Dec-21	8.00	2319
Jan-22	9.50	2536
Feb-22	9.50	2473
Mar-22	10.50	2447
Apr-22	9.50	2761
May-22	10.00	2731
Jun-22	10.50	2775
Jul-22	8.50	2546
Aug-22	8.50	2462
Sep-22	8.90	2561
Oct-22	9.50	2647

3.1 Forecast for November 2022 using the below methods; [15 marks]

- a) use the below snapshot from the regression analysis output to forecast if the price is at NAD 7.50 [5 marks]

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1748.565	468.3317	3.733604	0.003887	705.0571	2792.073	705.0571	2792.073
price	86.13126	49.61496	1.735994	0.113215	-24.4178	196.6803	-24.4178	196.6803

- b) Exponential smoothing using $\alpha=0.05$ and naïve forecasting method for the first forecast [5 marks]
- c) 3-month-Weighted moving average using a weight of 0.5 for the first period, 0.3 for the next and 0.2 for the oldest period. [5 marks]

3.2 Calculate the below for all the three methods used in 3.1 above [26 marks]

- a) CFE [5 marks]
- b) MAD [8 marks]
- c) MAPE [8 marks]
- d) TS [5 marks]

3.3 Choose which forecasting method is best suitable for the data and justify [5 marks]

QUESTION 5

[19 MARKS]

The below data shows house prices and their respective features.

House	price	bedroom	toilets	ERF size sq	Swimming pool
1	2,600,000	3	3.5	798	1
2	1,989,500	3	3.5	652	0
3	2,978,525	4	4.5	629	1
4	2,356,536	4	4.5	705	1
5	2,456,852	3	3	765	1
6	2,365,632	4	4.5	740	1
7	3,256,325	5	4.5	789	1
8	3,256,545	4	4.5	806	1
9	2,758,635	5	5.5	796	0
10	3,059,686	5	5.5	785	1
11		4	3.5	629	0

The data was run through regression at 95% confidence level, and below is the output.

SUMMARY OUTPUT									
<i>Regression Statistics</i>									
Multiple R	0.795299048								
R Square	0.632500576								
Adjusted R Square	0.338501037								
Standard Error	346416.6402								
Observations	10								
<i>ANOVA</i>									
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>				
Regression	4	1.03E+12	2.58E+11	2.151366	0.21133526230				
Residual	5	6E+11	1.2E+11						
Total	9	1.63E+12							
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>	
Intercept	302785.4823	1456554	0.207878	0.843526	-3441406.616	4046978	-3441407	4046978	
bedroom	393426.4856	375572.8	1.047537	0.342825	-572014.1817	1358867	-572014	1358867	
toilets	-96722.20708	365611	-0.26455	0.801915	-1036555.22	843110.8	-1036555	843110.8	
ERF size square meter	1288.433712	1983.311	0.649638	0.544586	-3809.830648	6386.698	-3809.83	6386.698	
Swimming pool	362822.513	285400.6	1.271275	0.259559	-370822.9651	1096468	-370823	1096468	
<i>RESIDUAL OUTPUT</i>					<i>PROBABILITY OUTPUT</i>				
<i>Observation</i>	<i>Predicted price</i>	<i>Residuals</i>	<i>Standard Residuals</i>		<i>Percentile</i>	<i>price</i>			
1	2,535,530	64470.17	0.249687		5	1989500			
2	1,984,596	4904.006	0.018993		15	2356536			
3	2,614,489	364036.2	1.40988		25	2365632			
4	2,712,410	-355874	-1.37827		35	2456852			
5	2,541,373	-84520.6	-0.32734		45	2600000			
6	2,757,505	-391873	-1.51769		55	2758635			
7	3,214,065	42260.31	0.16367		65	2978525			
8	2,842,542	414003.4	1.603398		75	3059686			
9	2,763,539	-4904.01	-0.01899		85	3256325			
10	3,112,189	-52502.7	-0.20334		95	3256545			

Analyse the above data and multiple regression output and answer below.

5.1 Carefully study the regression output above and interpret the below results.

- a) R square [5 marks]
- b) Significance F [5 marks]
- c) Coefficients [5 marks]
- d) Residuals output [4 marks]

Section B subtotal: 70 marks

GRAND TOTAL: 100 MARKS