UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATION, APRIL 2023

COURSE NO: MA 477

COURSE NAME: TIME SERIES AND FORECASTING I

CLASS: MA IV

TIME: 3 HOURS

Name: _____ Index Number: _____

ANSWER ONLY THREE QUESTIONS. QUESTION ONE AND ANY OTHER TWO QUESTIONS

EACH MAIN QUESTION CARRIES 20 MARKS

Q1. (a). State the three primary uses of time series analysis 3 marks

(b). Explain the difference between time series analysis and time series data 2 marks

(c). You have a piece of good farmland where you think there may be diamonds. You have to decide whether to farm there or start mining. If you decide to farm you can either plant cocoa for export, or you can grow various produce for own use and sell locally. If you want to dig for diamonds you can either get a geologist in to test for diamonds, or just start digging. The probability of a good outcome with deciding on diamonds and getting a geologist, is 0.25. The value of this outcome is GHC1,000,000 and the value of a poor outcome is GHC40,000. The cost involved with a geologist is GHC200,000. The value of a positive outcome without a geologist is also GHC1, 000,000 and the probability of a good outcome is 0.05. The value of a poor outcome is GHC20,000. With cocoa the costs are GHC300, 000 and the probability of success is estimated at 0.6. The value of success here is GHC600, 000. The value of no success here is GHC20, 000. With various produce the cost is GHC40, 000 and the probability of success is 0.9 with a final value of GHC600, 000. The value of an unsuccessful outcome is GHC30, 000. Will you farm or mine? Use a decision tree to analyse the situation. Write up your final decision and justify the course of action you will take. 15 marks

Q2. (a). Explain the following terms:

i. Payoff table

ii. Maximin decision rule

iii. Expected Monetary Value 3 marks

(b). An inventor develops a new product. Having made the product, he has three choices of what to do with it: 1. Manufacture the product himself, 2. Allow someone else to make it and be paid on royalties'

basis, 3. Sell the rights for a lump sum. The profit which can be expected depends on the level of sales and is shown in the table below (Ghc 1000s)

	High Sales	Medium sales	Low sales
Manufacture	80	40	-20
Royalties	50	30	10
Sell	20	20	20

The probabilities associated with the level of sales are 0.2, 0.5 0.3 for high, medium and low sales respectively.

i. Write down the best decision using:

α. The maximax rule 1 mark

β. The maximin rule 1 mark

λ. The minimax regret rule 1 mark

ii. Calculate the best decision using the expected monetary value. 3 marks

(c). Medeama Football club plays 50% of their home matches at Tarkwa Akon park and 50% away from home. The team wins 65% of their home matches and 46% of their away matches. If Medeama Football club played a match on last Sunday and won, what is the probability that they played a home match? 11 marks

Q3. (a). Explain the term Consumer Price Index (CPI) 2 marks

(b). The prices and quantities of a basket of goods and services considered typical for the average person is provided in the table below.

Item	2001		2002		2003	
	Price (Ghc)	**Quantity**	**Price (Ghc)**	**Quantity**	**Price (Ghc)**	**Quantity**
Cassava	20/kg	60kg	35kg	55kg	45kg	40kg
Rent	250/2-room	1 (2-room)	300/2-room	1 (2-room)	500/room	1(2-room)
Gari	400/kg	15kg	500kg	13kg	650/kg	11kg
Education	300/pupil	2 pupil	350/pupil	2 pupil	470/pupil	2 pupil
Dress	500/dress	6 dresses	550/dress	4/dresses	700/dress	3/dresses
Transport	100/day	30 days	250/day	30days	300/day	30days

Using 2001 as base year, compute and interpret for 2002 and 2003 Consumer price index. 15 marks

(c). You have been promised GHc 100,000 in 5 years' time. What would this amount worth now, assuming an interest rate of 6%. 3 marks

Q4. (a). State the Four components of time series 2 marks

(b). You have just completed an analysis into the sales (GHc 1000) of drinks over 3 the past years and the result is shown in the table below.

the level of sales

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2020	10	14	15	16
2021	12	10	13	11
2022	8	14	16	10

i. Determine the average seasonal factors of the sales of the drinks (All values in 2 decimal places). 8 marks

(c). The number of employees of Goldfields mining company from 2000 to 2007 is shown in the table below;

Year	2000	2001	2002	2003	2004	2005	2006	2007
Employees	47	32	64	22	80	75	32	56

i. Test the significance of the regression coefficient at 5% level. 10 marks

0.01 + 0.01 + 0.01 + 0.1

0.010

Examiner Assoc Prof L. Brew

$\frac{b_1 - B_0}{\varepsilon_x}$

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