

Part C – Essay Questions

Answer all questions in Part C.

Marks allocation: 50 Marks

1. In Orange County, 51% of the adults are males. Also, 9.5% of adult males smoke cigars, whereas 1.7% of adult females smoke cigars.

a) If an adult is randomly selected, what is the probability that the selected adult smokes cigars?

(02 Marks)

b) If a selected adult smokes cigars, what is the probability that adult is a male?

(03 Marks)

2. MAS Textiles can buy a certain type of yarn from one of two vendors. The vendors' products appear to be compatible in all respects except price and, possibly, breaking strength. **The manufacturer will buy from Vendor 1 (whose price is lower) unless there is reason to believe that vendor 1's product has a lower mean breaking strength than Vendor 2's.**

Random samples are drawn from the two vendors' stocks, with the following results. Assume that breaking strengths are approximately normally distributed.

Vendor 1	$n = 10$	$\bar{X} = 94$	$S^2 = 14$
Vendor 2	$n = 12$	$\bar{X} = 98$	$S^2 = 9$

a) Based on an appropriate hypothesis test with $\alpha = 0.05$, would you advise the manufacturer to buy the cheaper yarn?(Assume that the population variances are equal)

(05 Marks)

b) Repeat part a) under the assumption that the population variances are not equal.

(05 Marks)

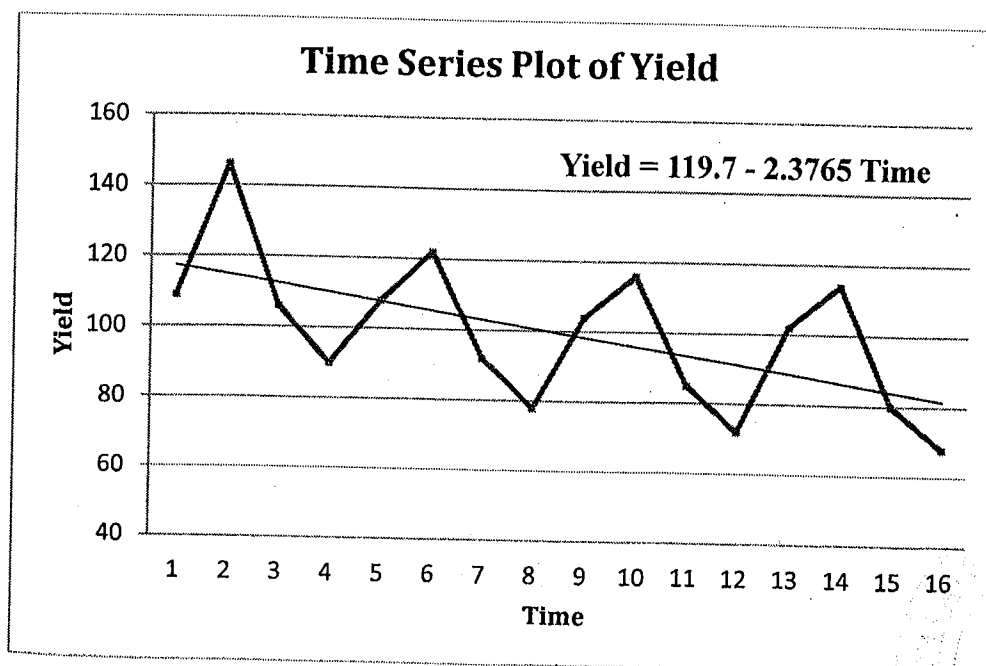
3. The following *Table 01* gives the quarterly yield of coconuts (in thousands) from a single estate over a period of 4 years and *Figure 03* gives the time series plot.



Table 01: Quarterly yield of coconuts (in thousands)

Year	Quarter	Yield	Estimated Trend Values
2005	1	109	117.32
	2	146	114.95
	3	106	112.57
	4	90	110.19
2006	1	108	107.82
	2	122	105.44
	3	92	103.06
	4	78	100.69
2007	1	104	98.31
	2	116	95.94
	3	85	93.56
	4	72	91.18
2008	1	102	88.81
	2	114	86.43
	3	80	84.05
	4	68	81.68

Figure 03: Time series plot of quarterly yield of coconuts (in thousand)



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- a) Comment the time series plot of yield (*Figure 03*). (03 Marks)
- b) By assuming the **Additive Model**, estimate the seasonal component. (10 Marks)
- c) Forecast the coconut yield for the first two quarters of the year 2009. (The fitted trend model $T = 119.7 - 2.3765t$) (02 Marks)

4. An analyst is studying the relationship between GE shopping center traffic and a department store's daily sales. The analyst develops an index to measure the daily volume of traffic entering the shopping center, and an index of daily sales. The following table shows the index values for ten randomly selected days.

Traffic Index (X)	71	82	111	85	89	110	111	121	129	132
Sales Index (Y)	250	280	301	325	328	390	410	420	450	475

$$\sum x_i = 1041 \quad \sum y_i = 3629 \quad \sum x_i y_i = 390918$$

$$\sum x_i^2 = 112359 \quad \sum y_i^2 = 1369435$$

- a)
- i. Find the coefficient of correlation. (02 Marks)
 - ii. Test the significance of the population correlation coefficient at 5% level of significance. (03 Marks)
 - iii. Fit the simple linear regression line, taking the Sales index as the dependent variable and Traffic index as the independent variable. (03 Marks)
 - iv. Find the coefficient of determination and comment on it. (02 Marks)
 - v. Construct the ANOVA table and check whether the modal is significance or not. (05 Marks)
- b) The analyst has recorded the data from three branches (say A, B and C) of GE shopping center to check whether there is an influence of branch for Sales index in additional the Traffic index. Suggest the suitable regression model and state the three hypothetical regression lines for three branches separately.

Hint: Consider the branch as a Dummy variable

(05 Marks)