

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.**  
**(For candidates admitted during the academic year 2015-16 and thereafter)**  
**SUBJECT CODE: 15CM/AC/ST45**

**B.Com. / B.Com (A&F) DEGREE EXAMINATION APRIL 2019**  
**FOURTH SEMESTER**

**COURSE : ALLIED – CORE**  
**PAPER : STATISTICAL TECHNIQUES FOR BUSINESS**  
**TIME : 3 HOURS** **MAX. MARKS: 100**

**SECTION – A**

**I. ANSWER ALL THE QUESTIONS** **(10 x 2 = 20)**

1. What is meant by Time Series Analysis?
2. From the following data, fit the straight line trend by the method of semi-averages:

Year	2011	2012	2013	2014	2015
Profit before tax Rs.	28,00,000	29,40,000	30,20,000	27,00,000	32,50,000

3. What are Type I and Type II errors in tests of hypothesis?
4. A sample of 900 items has mean 3.4 and standard deviation 2.61. Can the sample be regarded as drawn from a population with mean 3.25 at 5% level of significance?
5. Distinguish between parameter and statistic.
6. What is Standard Error of the mean?
7. What are Yate's Corrections?
8. On the basis of the following information calculate  $r_{23.1}$   
 $r_{12} = 0.70$ ;  $r_{13} = 0.61$ ;  $r_{23} = 0.40$
9. Which of the following statements is True or False:
  - a) The analysis of variance helps us to test the equality of two or more sample variances.
  - b) Analysis of variance cannot be used when there are samples of unequal sizes.
10. Certain oil is packed in tins holding 16kg each. the filling machine can maintain this but with a standard deviation of 0.5kg. Samples of 25 are taken from the production line. If a sample mean is 16.36kg. Can we be 95% sure that the sample has come from a population of 16kg tins?

**SECTION – B**

**II. ANSWER ANY FIVE QUESTIONS** **(5 x 8 = 40)**

11. Using three year moving averages determine the trend and short term fluctuation:

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Production In 000 tons	21	22	23	25	24	22	25	26	27	26

12. The following contingency table shows the classification of 1000 workers in a factory, according to the disciplinary action taken by the management and their promotional experience. Use Chi-square test to ascertain whether the disciplinary action taken and promotional experience are associated.

Disciplinary Action	Promotional Experience		Total
	Promoted	Not Promoted	
Offenders	30	670	700
Non Offenders	70	230	300
Total	100	900	1000

13. a) A sample of 900 members to have a mean of 3.47cm. Can it be reasonably regarded as a sample from a large population with mean of 3.23cm and standard deviation of 2.31cm?
- b) The sales manager of a large company conducted a sample survey in states A and B taking 400 samples in each case. The results were as follows:

	State A	State B
Average Sales	Rs.2,500	Rs.2,200
Standard Deviation	Rs.400	Rs.550

Test whether the average sales is the same in the 2 states at 1% level.

14. Calculate the trend values by the method of least squares. Also calculate the monthly increase in sales and trend value for 2020. (5 Marks)

Year	2012	2013	2014	2015	2016	2017	2018
Sales ( Rupees in Lakhs)	125	128	133	135	140	141	143

15. There are three main brands of a certain soap. A set of 120 sample values is examined and found to be allocated among four groups A, B, C and D and three brands, X, Y and Z as shown here under.

Brands	Groups			
	A	B	C	D
X	0	4	8	15
Y	5	8	13	6
Z	18	19	11	13

Is there any significant difference in brands preference? answer at 5% level, using one way ANOVA.

16. The correlation between a general intelligence test and school achievement in a group of children from 6 to 15 years old is 0.80. The correlation between the general intelligence test and age in the same group is 0.70 and the correlation between school achievement and age is 0.60. What is the correlation between general intelligence and school achievement in children of the same age? comment on the result.
17. Given  $r_{12} = 0.28$ ;  $r_{23} = 0.49$ ;  $r_{31} = 0.51$  and  $\sigma_1 = 2.7$ ,  $\sigma_2 = 2.4$ ,  $\sigma_3 = 2.7$  find the regression equation of  $x_3$  on  $x_1$  and  $x_2$ .

### SECTION – C

#### III. ANSWER ANY TWO QUESTIONS

(2 x 20 = 40)

18. The following table gives the monthly sales (in thousand rupees) of a certain firm in three states by its four salesmen:

States	Salesmen				Total
	A	B	C	D	
X	5	4	4	7	20
Y	7	8	5	4	24
Z	9	6	6	7	28
Total	21	18	15	18	72

Set up an analysis of variance table for the above information. Calculate F-coefficients and test whether the difference between sales made by the four salesmen and difference between sales happened in three States are significant.

19. From the following data, Calculate Seasonal Indices by the Ratio to Moving Average method:

Year	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
2001	68	62	61	63
2002	65	58	66	61
2003	68	63	63	67

20. Two researchers adopted different sampling techniques while investigating the same group of students to find the number of students falling in different intelligence levels. The results are as follows:

No. of Students in each level					
Researcher	Below average	Average	Above average	Genius	Total
X	86	60	44	10	200
Y	40	33	25	2	100
Total	126	93	69	12	300

Would you say that the sampling techniques adopted by the two researchers are significantly differ? Use Chi-Square test.

21. a) The mean breaking strength of the cables supplied by a manufacturer is 1800 with a standard deviation of 100. By a new technique in the manufacturing process it is claimed that the breaking strength of the cables is increased. In order to test this claim a sample of 50 cables is tested. It is found that the mean breaking strength is 1850. Can we support that claim at 1% level of significance?
- b) Talcum powder is packed into tins by a machine. A random sample of 11 tins drawn, and their contents are found to weigh in lbs as follows:

0.44, 0.51, 0.49, 0.52, 0.45, 0.48, 0.46, 0.45, 0.47, 0.45 and 0.47  
 Test of the average packing can be taken to be 0.5 lbs.

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