

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.  
(For candidates admitted during the academic year 2004-2005 & thereafter)

SUBJECT CODE : CM/AO/AS43

**B.Com. DEGREE EXAMINATION APRIL 2009**  
COMMERCE  
FOURTH SEMESTER

COURSE : **ALLIED – OPTIONAL**  
PAPER : **APPLIED STATISTICS**  
TIME : **3 HOURS** **MAX. MARKS : 100**

**SECTION – A**

ANSWER ALL QUESTIONS: ( 10 x 3 = 30 )

1. What is Time Series? What are its main component?
2. Convert the following annual trend equations on a monthly basis.  
 $Y = 106 + 0.8X + 0.64X^2$
3. Fit a trend line to the following data by the method of semi-averages:

Year	2001	2002	2003	2004	2005	2006	2007
Sales of Firm (thousand units)	102	105	114	110	108	116	112

4. Four coins are tossed simultaneously. What is the probability of getting  
a) 2 heads and 2 tails      b) at least one head.
5. What are the assumptions of Poisson distribution? Explain the distribution stating its mean and variance.
6. State two properties of a normal distribution.
7. What do you understand by t-test? Indicate some practical applications of t-test problem.
8. A random sample of size 16 53 as mean. The sum of the square of the deviations taken from the mean is 135. Can this sample be regarded as taken from the population having 56 as mean at 95% level of significance.
9. What is meant by  $\chi^2$  distribution. Explain two uses of the distribution in test of significance.
10. What are the basic and common assumptions made for analysis of variance?

**SECTION – B**

ANSWER ANY FIVE QUESTIONS:

( 5 x 8 = 40 )

11. What is meant by seasonal variations of a time series? Discuss the different method for determining seasonal variations of a given time series?
12. For the following table: i) Fit a straight line trend by the method of least squares.  
ii) Calculate the trend values

Year	1996	1997	1998	1999	2000	2001	2002
Production	12	10	14	11	13	15	16

13. Find the probability that at most 5 defective bolts will be found in a box of 200 bolts, if it is known that 2% of such bolts are expected to be defective.
14. The customer accounts of a certain departmental store have an average balance of Rs.120 and standard deviation of Rs.40. Assuming that the account balances are normally distributed : i) What proportion of the account is over Rs.150?  
ii) What proportional of account is between Rs.100 and Rs.150?  
iii) What proportional of account is between Rs.60 and Rs.90?
15. An examination was given to two classes consisting of 40 and 50 students respectively. In the first class the mean mark was 74 with a standard deviation of 8, while in the second class the mean mark was 78 with a standard deviation 7. Is there a significant difference between the performance of the two classes at a level of significance of 0.05?
16. A drug is given to 10 patients and the increments in their blood pressure were recoded to be 3, 6, -2, 4, -3, 4, 6, 0, 0, 2. Is it reasonable to believe that the drug has no effect on change of blood pressure?
17. Describe the techniques of Analysis of variances with an illustration for a one way classification.

**SECTION – C**

ANSWER ANY TWO QUESTIONS:

( 2 x 15 = 30 )

18. The prices of a commodity during 2002-2007 are given below. Fit a parabola  $Y = a + bX + cX^2$  to these data. Estimate the price of the commodity for the year 2008:

Year	2002	2003	2004	2005	2006	2007
Prices	100	107	128	140	181	192

Also plot the actual and trend values on the graph.

19. The screws produced by a certain machine were checked by examining samples of 12. The following table shows the distribution of 128 samples according to the number of defective items they contained.

No. of Defectives	0	1	2	3	4	5	6	7
No. of samples	7	6	19	35	30	23	7	1

Fit a binomial distribution and find the expected frequencies if the chance of screw being defective is  $\frac{1}{2}$ . Find the mean and variance of the fitted distribution.

20. a) A manufacturer of TV sets was trying to find out variables influenced the purchase of a TV set. Level of income was suggested as possible variable influencing the purchase of TV sets. A sample of 500 households was selected and the information obtained is classified as shown below:

	Have TV set	Do not have TV set
Low income group	0	250
Middle income group	50	100
High income group	80	20

Is there evidence from the above data of a relation ownership of TV sets and level of income?

- b) A machine puts out 16 imperfect articles in a sample of 500. After the machine is overhauled, it puts out 3 imperfect articles in a batch of 100. Has the machine improved?

21. A tea company appoints four salesman A, B, C and D and observes their sales in three seasons – summer, winter and monsoon. The figures (in lakhs) are given below:

Seasons	A	B	C	D	Season's total
Summer	36	36	21	35	128
Winter	28	29	31	32	120
Monsoon	26	28	29	29	112
Salesmen's total	90	93	81	96	360

- i) Do the salesmen significantly differ in performance?  
 ii) Is there significant difference between the seasons?  
 (F=8.94) at 5% level for  $v_1=6$  and  $v_2=3$ .  
 (F=19.33) at 5% level for  $v_1=6$  and  $v_2=2$ .

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