LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

FOURTH SEMESTER – APRIL 2013

ST 4205 - ADVANCED STATISTICAL METHODS

Date: 29/04/2013   Dept. No.   Max. : 100 Marks
Time: 1:00 - 4:00

PART-A

Answer all the questions   **(10 x 2 = 20)**

1. Define null and alternative hypothesis.
2. Write down all the methods of studying association.
3. Give the formula for Yule's Coefficient of partial association between A and C with B.
4. Define probability with an example.
5. Write any three properties of Normal distribution.
6. Give the test statistic for the test of single proportion.
7. Define mean sum of squares.
8. What is ANOVA?
9. What are the various types of control charts?
10. Give the control limits of the R chart.

PART-B

Answer any 5 questions   **(5 x 8 = 40)**

11. From the data given below, calculate Yule's coefficient of association and colligation between weight of children and their economic condition and interpret it.

	Poor children	Rich children
Below normal weight	80	30
Above normal weight	8	55

12. (i) State multiplication theorem of probability.   (2)
    (ii) State and prove addition theorem of probability. (6)

13. An article manufactured by a company consists of two parts A and B. In the manufacture process of part A, 9 out of 100 are likely to be defective. Similarly, 5 out of 100 are likely to be defective in the manufacture of part B. Find (i) the probability that the assembled part will not be defective.(ii) the probability that the assembled part will be defective

14. An I.Q. Test was administered to 8 persons before and after they are trained. The results are given below:

Candidates	1	2	3	4	5	6	7	8
I.Q Before	15	17	12	18	16	13	15	17
I.Q After	20	19	18	22	20	19	21	23

Test whether there is any significant change in I.Q. after the training programme at 5% level of significance.

15. Before an increase in excise duty on tea 400 people out of a sample of 500 persons were found to be Tea drinkers. After an increase in the duty, 400 persons were known to be a tea drinker in a sample of 600 people. Do you think that there has been a significant decrease in the consumption of tea after the Increase in the excise duty?

16. Explain the method of analysis of variance for one way classification.

17. A random sample of 100 T.V tubes was taken from daily production of large output and the number of defective tubes was noted. On the basis of the information given below prepare a p-chart and state your conclusions.

Sample No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of defectives	4	6	10	8	3	15	12	4	5	7	9	8	11	13	2

18. From the following data, calculate coefficient of contingency.

N=500; (A)=220; (B)=80; (AB)=50

PART-C

Answer any 2 questions (2 x 20 = 40)

19. A farmer applied three types of fertilizers on 4 separate plots. The figures on yield per acre are tabulated below:

Fertilizers	Plots			
	A	**B**	**C**	**D**
Nitrogen	12	7	9	10
Potash	7	6	6	7
Phosphates	8	5	10	9

Test (i) whether the mean yield is the same for the four plots and
(ii) Whether the mean yield is the same for three fertilizers at 0.05 level.

20. (i) During an examination of equal length of cloth, the following are the number of defects observed:
2, 3, 4, 10, 5, 6, 7, 4, 12, 3
Draw a control chart for number of defects (C-chart) and comment whether the process is under control or not. (8)

(ii) A machine is set to deliver packets of a given weight. 10 samples of size 5 each were recorded. Below are given the relevant data: (12)

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	15	17	15	18	17	14	18	15	17	16
Range	7	7	4	9	8	7	12	4	11	5

Calculate the values for the central line and the control limits for mean and range chart, and then comment on the state of control.

21. (i) Below are given the gain in weight in kgs of cows fed on two diets X and Y:

Diet X	25	32	30	32	24	14	32			
Diet Y	24	34	22	30	42	31	40	30	32	35

Test at 5 % level whether the two diets in differ significantly as regards their effect on mean increase in weight by using t-test for difference means.
(10)

(ii) A certain drug is claimed to be effective in curing cold. In an experiment on 170 people with cold, half of them were given the drug and another half of them were given sugar pills.The patient's reaction to the treatment is recorded in the following table:

	Helped	Harmed	No effect
Drug	55	24	45
Sugar pills	43	15	35

Test the hypothesis that the drug is no better than sugar pills for curing cold by using chi-square test. (10)

22. (i) The probability distribution of a random variable X is given below. Find the 'K' values and also find mean and variance (10)

X	0	1	2	3
P(X)	1/8	3/8	3/8	K

(ii) Box-I contains 7 Red, 5 Blue, 4 Green balls
Box-II contains 10 Red, 4 Blue, 3 Green balls
Box-III contains 9 Red, 7 Blue, 8 Green balls
Five balls were drawn at random from one of the Box and they are found to be 2 green, 2 red and a blue. Find the probability that it was from Box-II and Box III. (10)