



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Com. DEGREE EXAMINATION – COMMERCE**

THIRD SEMESTER – NOVEMBER 2011

**ST 3202/3200 - ADVANCED STATISTICAL METHODS**

Date : 11-11-2011

Dept. No.

Max. : 100 Marks

Time : 9:00 - 12:00

**SECTION A**

**(10 X 2 = 20 marks)**

**Answer ALL questions.**

1. What is meant by independence of attributes?
2. Define probability and give an example.
3. State addition theorem on probability.
4. Write any four properties of normal distribution.
5. State Type - I and Type - II error.
6. Explain the term standard error.
7. Give an example for one-way classification.
8. State the assumptions made in analysis of variance.
9. What is meant by statistical quality control?
10. Distinguish between p chart and c chart.

**SECTION B**

**(5 X 8 = 40 Marks)**

**Answer any FIVE questions**

11. State and prove Baye's theorem.
12. Two Urns contain respectively 10 white, 6 red and 9 black and 3 white 7 red and 15 black balls. One ball is drawn from each Urn. Find the probability that  
(i) Both balls are red (ii) Both balls are of the same colour.
13. If 3% of the electric bulbs manufactured by a company are defective, find the probability that in a Sample of 100 bulbs exactly five bulbs are defective. ( $e^{-3} = 0.0498$ )
14. What is Sampling Technique ? Explain different types of Sampling.
15. A random samples of 400 men and 600 women were asked whether they would like to have a fly-over near their residence. 200 men and 325 women were in favor of it. Test the equality of proportion of men and women in the proposal? Test at 5% level.

16. An IQ test was administered to 5 persons before and after they were trained. The results are given below:

Candidates	I	II	III	IV	V
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether there is any change in IQ after the training programme. Use 5% level of significance

17. Out of 8000 graduates in a town, 800 are females and out of 1600 graduate employees 120 are females. Use Chi-square to determine if any distinction is made in appointment on the basis of sex? Test at 5% level.

18. The following table gives the number of defective items found in 20 successive samples of 100 items each

2 6 2 4 4 15 0 4 10 18 2 4 6 4 8 0 2 2 4 0

Comment whether the process is under control. Suggest suitable control limits for the future.

### SECTION C

(2 X 20 = 40 Marks)

Answer any TWO questions

19.(a) A number of school-children were examined for the presence or absence of certain

defects of which three chief descriptions were noted; A-development defects; B-nerve signs; C low nutrition. Given the following ultimate frequencies, find the frequencies of the classes defined by the presence of the defects.

$$(ABC) = 57; (\alpha BC) = 78$$

$$(AB\gamma) = 281; (\alpha B\gamma) = 670$$

$$(A\beta C) = 86; (\alpha\beta C) = 65$$

$$(A\beta\gamma) = 453; (\alpha\beta\gamma) = 8310 \quad (10)$$

19.(b) ) A real estate agent estimates that Mr X's plot of land will go up in market value by 20% or more in the next year with a probability of 0.5. he also estimates that the Mr Y's plot will increase in that market value by 20% or more in the next year with prob of 0.75. He estimates that that the probability that Z will take his advice and buy Mr X's plot is 0.70 and buy Y's plot 0.30. If Y at the end of 1 year Z's new plot increases in value by more that 20%. What is the probability that he purchased

• Mr X's plot

\* Mr Y's plot. (10)

20. (a) A Company has four production sections viz. S1, S2, S3 and S4 , which contribute 30%, 20%, 28% and 22% of the total output. It was observed that those sections respectively produced 1%, 2%, 3% and 4% defective units. If a unit is selected at random and found to be defective, what is the probability that the units so selected has come from either S1 or S4.? (10)

20. (b) The customer accounts of a certain departmental store have an average balance of Rs.120 and a standard Deviation of Rs.40. Assuming that the account balances are normally distributed, find
- (i) What proportion of accounts is over Rs.150?
  - (ii) What proportion of accounts is between Rs.100 and Rs.150?
  - (iii) What proportion of accounts is between Rs.60 and Rs.90 ? (10)

21.(a) A market research organization is assessing that the effectiveness of recent newspaper advertising campaign was carried out on behalf of a food manufacturer. A random sample of 150 people were questioned before the campaign and 48 had heard of this manufacturer. Another random sample 250 people were questioned after the advertising campaign 115 of these people had heard of this manufacturer. Does this provide evident of significant increase in the proportion of people who have heard of this manufacturer . (10)

21. (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 follow

	State A	State B
Average sales	Rs.2500	Rs.2200
Standard Deviation	Rs.400	Rs.550

Test whether the average sales is the same in the two states. Test at 1% level. (10)

22. The following table gives the fields of 15 samples of plot under three varieties of seed.

A	B	C
20	18	25
21	20	28
23	17	22
16	15	28
20	25	32

Test using analysis of variance whether there is a significant difference in the average yield of seeds. (20)

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