

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

B.Com. DEGREE EXAMINATION – COMMERCE

THIRD SEMESTER – NOVEMBER 2009

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

Date & Time: 13/11/2009 / 9:00 - 12:00 Dept. No.

Max. : 100 Marks

**SECTION – A**

**Answer ALL the questions**

**(10 x 2 = 20)**

1. What is meant by Independence of attributes?
2. Find the frequency of the class AB if A and B are independent, given  $N=100$ ,  $(A)=36$ ,  $(B) = 25$ .
3. Define conditional probability.
4. 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 ( $e^{-3}=0.0498$ ).
5. Define null hypothesis.
6. What is meant by probable error ? Mention its use.
7. Explain the different type of errors in hypothesis testing.
8. Give an example for one-way classification.
9. What is meant by statistical quality control?
10. Distinguish between np chart and p chart.

**SECTION – B**

**Answer any FIVE questions**

**(5 x 8 = 40)**

11. Out of 8000 graduates in a town, 800 are females and out of 1600 graduate employees 120 are females prepare  $2 \times 2$  table and find the co-efficient of prepare a association. Interpret the result.
12. A Sub-Committee of 6 members is to be formed out of a group consisting of 7 men and 4 women. Calculate the probability that the sub-committee will consist of (1) exactly 2 women (2) at least 2 women.
13. Find the probability that atmost 5 defective fuses will be found in a box of 200 fuses if experience shows that 2 per cent of such fuses are defective. ( $e^{-4}=0.0183$ )
14. The means of two samples of 1000 and 2000 members are respectively 67.5 and 68 inches. Can they be regarded as drawn from the same population with S.D. 2.5 inches? Use 5% level.
15. A machine produced 20 defective articles in a batch of 400. After overhauling it produced. 10 defectives in a batch of 300. Has the machine improved? Test at 5% level.
16. In a sample of 8 observations, the sum of the squared deviations of items from the mean was 94.5. In another sample of 10 observations, the value was found to be 101.7. Test whether the difference in the variances is significant at 5% level.
17. Explain the various types of control charts.
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 monitoring the future. State of the process.

**SECTION - C**

**Answer any TWO questions.**

**(2 x 20 = 40)**

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.

$$\begin{aligned} (ABC) &= 57; & (\alpha BC) &= 78 \\ (AB\gamma) &= 281; & (\alpha\beta\gamma) &= 670 \\ (A\beta C) &= 86; & (\alpha\beta C) &= 65 \\ (A\beta\gamma) &= 453; & (\alpha B\gamma) &= 8310 \end{aligned}$$

(b) A Company has four production sections viz.  $S_1, S_2, S_3$  and  $S_4$ , 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  $S_1$  or  $S_4$ ?

20(a) If 10% of the screws produced by an automatic machine are defective, find the probability that of 20 screws selected at random, there are

- i) exactly two defectives
- ii) at the most three defectives
- iii) at least two defectives; and
- iv) between one and three defectives (inclusive)

Find also the mean, variance and skewness of the number of defective screws.

(b) Assume the mean height of soldiers to be 172 cm with variance  $(27 \text{ cm})^2$ . How many soldiers in a regiment of 1000 can be expected to be over 182 cm?

21(a) 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.

(b) In a survey of 200 boys, of which 75 are intelligent, 40 had skilled fathers while 85 of the unintelligent boys has unskilled fathers. Do these figures support the hypothesis that skilled fathers have intelligent boys. Use Chi-square test.

22. Perform a Two-way ANOVA on the data given below:

		Treatments		
		A	B	C
Blocks	1	30	26	38
	2	24	29	28
	3	33	24	35
	4	36	31	30
	5	27	35	33

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