2024

M.Com. 2nd Semester Examination

Commerce

PAPER : COM-202

(Advanced Statistics)

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

PAPER : COM-202.1

1. Answer *any* **two** questions from the following : 5×2

(a) Proof that the variance of Binomial distribution is npq.

(b) In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. Ascertain the mean and standard deviation of the distribution.

(c) Write a brief note on 'stratified sampling'.

2. Answer *any* **one** question of the following : 10

(a) (i) A lock manufacturing company supplies locks to a retailer in different batches. A single batch size contains 300 locks. The company's past record suggests that on an average, in a single batch, 10 locks are defective. The number of defects per batch follows Poisson distribution. In a random selection of locks in a batch :

(A) What is the probability of finding eight or fewer defectives in a batch?

(B) What is the probability that the batch contains $6 < x < 10$ defectives?

(ii) The average daily food expenditure of families in a certain area has a normal distribution with mean ₹ 125 and standard deviation ₹ 25. What is the probability that a family selected at random from this area will have an average daily expenditure on food in excess of ₹ 175? What is the probability that out of eight such families selected at least one family will have their daily food expenditure in excess of ₹ 175? 5+5

(b) (i) What is non-sampling error or bias? How does it arise in sampling?

(ii) Briefly discuss the procedure and applicability of multi-stage sampling with an example. 6+4

PAPER : COM–202.2

3. Answer *any* **two** questions of the following : 5×2

(a) Estimate the Poisson parameter λ *(lambda)* by maximum likelihood estimation method.

(b) Write brief notes on the following :

(i) Sufficient Estimator

(ii) Type–II error

(iii) Critical region 2+2+1

(c) State the basic assumptions of the analysis of variance.

4. Answer *any* **one** question of the following : 10×1

(a) (i) State the application of chi-square (χ^2) test. What precautions would you take while applying chi-square (χ^2) test?

(ii) A sample of 640 families is randomly selected from Mumbai City to study the income of father and their sons. The incomes are categorized into three heads : High, Medium and Low. The results are given below :

		Income of father			*Total*
		High	*Medium*	*Low*	
Income of son	High	60	100	40	200
	Medium	100	140	60	300
	Low	20	40	80	140
	Total	180	280	180	640

Test at 5% level of significance whether the sons' income is independent from the fathers' income. [Given, $\chi^2_{0\cdot05,\ 4} = 9\cdot488$]

(2+2)+6

(b) (i) A random sample of 16 ATM transactions in SBI ATM machines shows a mean transaction time of 67 seconds with a standard deviation of 12 seconds. Another random sample of 12 ATM transactions in HDFC Bank ATM machines shows a mean transaction time of 62 seconds with a standard deviation of 18 seconds. Test at 5% level whether the mean transaction time in the ATM Machines of two banks differ significantly.

[Given, $t_{0\cdot025,\ 26} = 2\cdot056$]

(ii) A dietician is studying the effectiveness of two different diets. Diet *A* and Diet *B*, in bringing weight loss. She applied two diets on two groups of people. Out of a randomly selected 100 people, she applied Diet *A* and found that 60 of them lost weight. On the other

hand, she applied Diet *B* on 120 randomly selected people and found that 78 lost their weight. Test at 5% level if there is any significant difference in the effectiveness of the two diets in bringing about weight loss. 5+5

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