

POST-GRADUATE COURSE
Term End Examination — December, 2009

M.Com.
ADVANCED STATISTICAL
CONCEPTS AND TOOLS

PAPER XIV

Time — 2 hours

Full marks—50
(Weightage of marks—80%)

Special credit will be given for accuracy and relevance in the answer. Marks will be deducted for incorrect spelling, untidy work and illegible handwriting. The weightage for each question has been indicated in the margin.

Group - A

Answer any two questions : 15×2=30

1.(a) For any Three events A, B and C prove that

$$P(A \cup B \cup C) = P(A) + P(B) + P(C)$$

$$- P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$$

(b) A Company has 3 plants to manufacture 8,000 scooters in a month. Plant - I, II and III manufactures 3500, 2500 and 2000 respectively per month. 97%, 94% and 98% scooters are rated standard quality in plant I, II and III respectively. What is the probability that a scooter selected at random comes from plant II if it is known that the scooter is of standard quality. 8

2.(a) If X and Y are two random variables having joint probability distribute :

X \ Y	1	3	5
2	·05	·10	·25
4	·15	·05	·15
6	·10	·10	·05

(i) Give marginal distribution of X and marginal distribution of Y. 2

(ii) Compute $P(X + Y = 7)$, $P(X + Y > 8)$, $P(Y=3/X=6)$ and $(P = 4 / Y = 5)$. 4

(iii) Are X and Y independent ? 2

(b) Three salesman A, B and C have been given a target of selling 10,000 units of a particular product, the probability of their success being respectively 0.63, 0.52 and 0.45. If those three salesman try to sell the product independently, find the probability, that at least one of them will be successful. 7

3.(a) Write down the P.D.F of the Normal Distribution and the properties of the Normal Curve. 7

(b) Compute mean and variance of the binomial distribution. 8

4.(a) Fit a Poisson distribution to the following data :

x :	0	1	2	3	4	5	6
f :	286	180	84	24	18	6	2

(b) The mean purchases per day per customer in a large store is Rs. 350/- with s.d. Rs. 100/-. If on a particular day 100 customers purchased for Rs. 478 or more, estimate the total number of customers who purchased from the store that day [$\phi(1.28) = 0.8997$]. 7

Group - B

Answer any two questions : $10 \times 2 = 20$

5.(a) Describe any two probabilistic sampling schemes. 5

(b) What are the differences between

(i) Parameter and Statistic. 5

(ii) Sampling error and non-sampling error. 5

6.(a) If the variance of two unbiased estimator T_1 and T_2 of θ are same, which of $\frac{T_1 + T_2}{2}$ and $\frac{3T_1 + T_2}{4}$ is the minimum variance unbiased estimator of θ ? 6

(b) Briefly describe different criteria of a good estimator. 4

7. A population consists of the numbers 16, 20, 24, 28.

(a) Enumerate all possible samples of size two which can be drawn from the population without replacement. 3

(b) Show that the means of the sampling distribution of the sample means is equal to the population mean. 4

(c) Compute the estimated standard error of the sample mean.

8.(a) 500 units from a factory are inspected and 12 are found to be defective. 800 units from another factory are inspected and 20 are found to be defective, can it be concluded that production in the second factory is better than in the first ?

$[Z_{0.05} = 1.64, Z_{0.01} = 2.33]$ 5

(b) A toothpaste company conducted a survey and found that it could sell only 60 tubes on an average per

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month per shop. The company advertised heavily in several media and after 3 months again conducted a survey and found that the mean sales was 76 tubes with a s.d. of 10 tubes in a sample of 20 shops. Can it be concluded that the advertisement is effective ?

$[t_{0.05; 19} = 1.729, t_{0.01; 19} = 2.861]$ 5

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