

MARCH 2008

[KS 251]

Sub. Code : 2851

M.Sc. (Biostatistics) DEGREE EXAMINATION.

First Year

**Paper I — PROBABILITY THEORY AND
DISTRIBUTIONS**

Q.P. Code : 282851

Time : Three hours Maximum : 100 marks

Answer ALL questions.

- I. Essays : (2 × 20 = 40)
1. (a) State and prove Helly-Bray Theorem.
(b) Show that convergence in probability implies in distribution.
2. (a) Define the chi-square statistic. Write its distribution. Explain the applications of chi-square statistic.
(b) Explain the test for the equality of mean vectors of the normal populations when the covariance matrices are equal but unknown.

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II. Write short notes on : (10 × 6 = 60)

1. Define a random variable. Show that if X is a random variable, So is $|X|$, and give an example to show that converse need not be true.
2. If X and Y are independent random variables, show that $g(X)$ and $h(Y)$ which are functions of X and Y respectively are also independent. Is the converse true?
3. If $X > Y$ almost surely, then show that $E(X) \geq E(Y)$.
4. Define convergence in probability. Give an example of a sequence $\{X_n\}$ of random variables which converges in probability.
5. State and prove Holder's inequality.
6. Explain the logistic distribution. Mention any two of its uses in Biostatistics.
7. Write a brief note on exponential distribution.
8. Define Partial and multiple correlation coefficient. Give an example.

9. Define Mahalanobis D^2 and bring its relation to Hotellings T^2 .

10. Obtain the maximum likelihood estimator of μ in the case of multivariate normal distribution $N_p(\mu, \Sigma)$
