

AUGUST 2005

[KN 251]

Sub. Code : 2851

M.Sc. (Biostatistics) DEGREE EXAMINATION.

FIRST YEAR

**Paper I — PROBABILITY THEORY AND
DISTRIBUTIONS**

Time : Three hours Maximum : 100 marks

**Sec. A & B : Two hours and Sec. A & B : 80 marks
forty minutes**

Sec. C : Twenty minutes Sec. C : 20 marks

Answer Sections A and B in the SAME answer book.

Answer Section C in the answer sheet provided.

Answer ALL questions.

SECTION A — (2 × 15 = 30 marks)

**1. Fit a poisson distribution to the following data
with respect to the number of red blood corpuscles (x)
per cells : (15)**

$x :$	0	1	2	3	4	5
Number of Cells :	142	156	69	27	5	1

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2. (a) The life time of a certain brand of an electric bulb may be considered a random variable with mean 1200 hours and standard deviation 250 hours. Find the probability using central limit theorem that the average life time of 60 bulbs exceeds 1400 hours. (10)
- (b) Explain the concept of 'Convergence in probability'. (5)

SECTION B — (10 × 5 = 50 marks)

3. (a) What is a discrete random variables? Give suitable example that are of interest to the health professional.
- (b) In a certain metropolitan area there is an average of one suicide per month. Find the probability that during a given month the number of suicides will be
- (i) Greater than one
 - (ii) Less than one
- (c) Explain what is meant by 'Probability space'.
- (d) Two fair dice are thrown independent. Three events A , B and C are defined as follows
- A : Odd face with first dice.
 B : Odd face with second dice.
 C : Sum of points on two dice is odd.
- Are the events A , B and C mutually independent?
- (e) What is the expectations of the number of failures preceding the first successes in an infinite series of independent trials with constant probability. P of success in each trials.

(f) The mean and variance of binomial distribution are 4 and $4/3$ respectively. Find $P(x \geq 1)$.

(g) Show that in a poisson distribution with unit mean, mean deviation about mean is $(2/e)$ times the standard deviation.

(h) Let the two independent random variables x_1 and x_2 have the same, geometric distribution show that the conditional distribution of $x_1(x_1 + x_2 = n)$ is uniform.

(i) Explain properties of the wishart distribution.

(j) The simple correlation coefficient between temperature (x_1), corn yield (x_2) and rainfall (x_3) are $r_{12} = 0.59$, $r_{13} = 0.46$, and $r_{23} = 0.77$. Calculate the partial correlation coefficients $r_{12.3}$, $r_{23.1}$ and $r_{31.2}$.