First Semester 2002/2003 **Final Examination** **Evening Program**

STAT 273 **Date: 15/01/2003**

Question 1: [8 marks]

The probability distribution function of a random variable X is given by

X	1	2	3	4	5
$f(x)$	$2k$	$4k$	$8k$	$5k$	k

Find (i) Value of "k" (ii) $P(2 < X \le 4)$ (iii) Variance.

Question 2: [8 marks]

(a) The boiling point of a silicon compound is a random variable with variance $\sigma^2 = 64$. A random sample of size $n = 36$ is drawn from this population. Use Chebyshev's theorem to find the probability that the sample mean be off by at most 1.6.

(b) If we want to determine the average mechanical aptitude of a large group of workers, how large a random sample will be needed to assert with probability 0.99 that the sample mean differ from true mean by less than 2.4 points. Assume that it is known from past experience that $\sigma = 12$.

Question 3 : [8 marks]

For the population with $\sigma = 2.4$, it is desired to test the null hypothesis $H_0 : \mu = 20$ on the basis of a random sample of size $n = 16$ is rejected if $\bar{x} > 21.11$

(i) Find the probability of type I error. (ii) Find value of β when $\mu = 22.58$.

Question 4 : [8 marks]

The annual rainfall at a certain place is approximately Normal variable. Nine measurements (in cm) of annual rainfall at that place gives: 20, 22, 18, 16, 23, 18, 18, 20 and 25.

(a) At the 0.05 level of significance test the null hypothesis $H_0 : \mu = 18$ against the alternative hypothesis $H_1 : \mu > 18$.

(b) Construct 90% confidence interval for the true mean μ.

Question 5 : [8 marks]

For the given data

X	1	2	4	6	10
Y	10	8	6	4	2

(a) Find the linear regression of Y on X and predict the value of X when $\hat{Y} = 5$.

(b) Compute correlation coefficient between the given variables.

Question 6 : [10 marks]

Fill in the blanks:

If $A, B \varepsilon S$ and $P(A) = 0.5$, $P(B) = 0.6$ and $P(A/B) = 0.2$ then

(I) $P(A \cap B') =$ -------------------------------- (II) $P(A/B') =$ --------------------------

(III) X has Poisson distribution with $\lambda = 2 \therefore \mu_2' =$ ---------------------------------

(IV) $P(t > -t_\alpha) =$----------------------------------

(V) For $N = 20$, $n = 4$, the value of population correction factor is ---------------------

(VI) If for a set of observations $\bar{x} = 25.6$ and $S = 3.2$ then the coefficient of variation $V =$

(VII) for $n = 10, P(t < k) = 0.95 \therefore k =$ ----------------------------------

(VIII) $Z_{0.025} =$ ---------------------------------------

(IX) $P\left(-Z_{0.1} < Z < Z_{0.15}\right) =$ ---------------------------------------

(X) The mean of a binomial distribution with $n = 20$ is 8, hence its variance $\sigma^2 =$ ----