 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**M.Sc.** DEGREE EXAMINATION - **STATISTICS**

THIRD SEMESTER – **APRIL 2012**

# ST 3814/3810 - STATISTICAL COMPUTING - II

Date : 26-04-2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**Answer any THREE questions:**

1. a) For three state Markov chain with states {0,1,2} and transition probability matrix

P = ,

              Find the mean recurrence transients of states 0, 1, 2. (22)

b). Let {Xn, n=0,1,2,...} be a Markov chain with state space {0,1,2} and one step transition          probabilities (12)

P =

             Find (i) P2 (ii)  (iii) P[X2 = 0] given X0 takes the values 0, 1, 2 with probabilities 0.3,

                     0.4, 0.3 respectively

2. Let **X ~ B ( 1, θ ); θ = 0.1, 0.2, 0.3.** Examine if UMP level **0.05** test exists for **H : θ = 0.2** Vs

**K : θ = 0.1, 0.3.** Otherwise find UMPU **0.05** test. (34)

1. In a population with N = 5, the Yi values are 9,10,1 1,12,13. Enlist all possible samples of

size n = 2, with SRSWOR and verify that E (s2) = S2.Also Calculate the standard error of the sample mean. (34)

         4. a) Given the normal distribution Np (μ, ∑)

        µ =  , ∑ = 

                  Find the conditional distribution of X1 and X2 given X3 = 205 (16)

              b) The distances between pairs of five objects are given below:

1 2 3 4 5

                Apply the *Single Linkage* Algorithm to carry out clustering of the five objects. (18)

1. (a) Consider a population of 5 units with values 1,2,3,4,5. Write down all possible samples of (without replacement) from this population and verify that sample mean is an unbiased estimate of the population mean. Also calculate its sampling variance and verify that
2. it agree with the formula for the variance of the sample mean, and
3. this variance is less than the variance obtained from sampling with replacement. (13)

(b) A sample of 30 students is to be drawn from a population consisting of 410 students belonging to        two colleges A and B. The means and standard deviations of their marks are given below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Total no. of students(Ni)** | **Mean** | **Standard deviation(σi)** |
| **College X** | 230 | 40 | 14 |
| **College Y** | 180 | 25 | 9 |

                      How would you draw the sample using proportional allocation technique? Hence obtain the variance of estimate of the population mean and compare its efficiency with simple random sampling without replacement. (21)