 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – **APRIL 2012**

# ST 4812 - STATISTICAL COMPUTING - III

Date : 23-04-2012 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**Answer any THREE questions**

1. Develop the ANOVA for R.L.S.D from the given data: (34)

WEEK-II

WEEK-I

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **VIVEK** | **VASANTH** | **CHELLA**  **MANI** | **VGP** |
| **MON** | A12 | B 22 | C 18 | D 18 |
| **TUE** | B 15 | C 30 | D 22 | A 22 |
| **WED** | C 18 | D 40 | A 14 | B 15 |
| **THU** | D 20 | A 50 | B 17 | C 20 |

|  |  |  |  |  |
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|  | **VIVEK** | **VASANTH** | **CHELLA**  **MANI** | **VGP** |
| **MON** | A14 | B 24 | C 18 | D 21 |
| **TUE** | B 12 | C 31 | D 23 | A 25 |
| **WED** | C 19 | D 39 | A 14 | B 17 |
| **THU** | D 24 | A 56 | B 18 | C 23 |

WEEK-III

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **VIVEK** | **VASANTH** | **CHELLA**  **MANI** | **VGP** |
| **MON** | A13 | B 25 | C 17 | D 23 |
| **TUE** | B 14 | C 33 | D 23 | A 26 |
| **WED** | C 20 | D 38 | A 15 | B 16 |
| **THU** | D 20 | A 57 | B 19 | C 24 |

1. (a) Solve the following LPP by solving its Dual problem : (16+18)

Max Z = 6X+8Y

Subject to, 5X+2Y≤ 20

X+2Y≤ 10

and X,Y≥0

(b) Solve the following LPP by Big-M Method:

Max Z = 5X1 -4 X2+ 3X3

Subject to, 2X1 +X2 -6 X3= 20

6X1 +5X2+10 X3 ≤ 76

8X1 -3X2+6 X3 ≤ 50

and X1,X2 ,X3≥0

1. (a) At public telephone booth in a post office, arrivals are considered to be Poisson,        with an average inter-arrival time of 12 minutes. The length of a phone call may        be assumed to be distributed exponentially with an average of 4 minutes.               Calculate the following.

  (i) What is the probability that a fresh arrival will have to wait for the phone?

(ii) Find the average number of units in the system.

(iii) What is the average length of the queue that forms from time to time?

(b) Surface defects on 20 steel plates were counted and the data are reported below:

               1 4 3 1 2 5 0 2 1 8

               2 1 3 4 6 5 3 1 4 2

Construct the relevant control chart for the process. Compute the OC function when the   average number of defects increases to: 4.5, 5.0, 5.5, 6.0, 6. (16+18)

1. In a study carried by agronomist to determine if major differences in yield response to N fertilizer exist among different variables/ varieties of jowar. The main plot treatments were 3 varieties of jowar ( V1: CO-18, V2: CO-19 and V3: CO-22) and the sub- plot treatment were N rates of 0, 30 and 60 kg/ ha. The study was replicated 4 times, and the data gathered for the experiment are shown in table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Replication** | **variety** | **N rate, kg/ha**  **0 30 60** | | |
| **I** | **V1** | 14.5 | 16.5 | 19.8 |
| **V2** | 19.5 | 23.5 | 29.2 |
| **V3** | 14.6 | 17.2 | 17.5 |
| **II** | **V1** | 17.9 | 19.2 | 23.5 |
| **V2** | 14 | 19.5 | 17.9 |
| **V3** | 15 | 14.8 | 17.3 |
| **III** | **V1** | 11.9 | 13.5 | 12.5 |
| **V2** | 19.2 | 17.5 | 24.5 |
| **V3** | 14.9 | 19.5 | 21.5 |
| **IV** | **V1** | 11.9 | 12.5 | 17.5 |
| **V2** | 12.5 | 16.5 | 13.9 |
| **V3** | 11.5 | 10.9 | 9.5 |

Analysis the above data by using split plot design. (34)

1. (a) Construct an Exponentially-Weighted Moving Average Control Chart for the following data on temperatures of a chemical process (in degrees centigrade) with the latest data point getting weight 0.3:

   953, 949, 937, 958, 952, 946, 939, 955, 931, 954, 963, 927, 941, 938, 957

(b) Compute the OC function and ASN of the Double Sampling Plan (n1 = 25, c1 = 2,

n2 = 10, c2 = 4) corresponding to the lot fraction defective values p = 0.02, 0.04, 0.06,                  0.08, 0.10, 0.12.

(15 + 19)