

4

**IV Semester M.Sc.(Statistics)  
Practical Examination, July. 2011**

**Paper 4.4 – Practical III**

**Time : 3 hrs.**

**Max. Marks: 40**

*Answer any three questions without omitting any part.*

**Part A (Advanced O.R)**

1. A department store procures recording tape from a well known manufacturer and supplies it in the brand name of the store. Because of special labeling and packaging, there is a lead time of 5.2 weeks. Assume that the demand during this period is normally distributed with a mean of 1000 tapes and a standard deviation of 250. the cost of paper work and handling associated with placing an order is Rs.100 and the holding cost is Rs.0.15/tape/year. Assume that backorders are taken penalty Rs.1/tape backordered. Obtain the optimum order quantity, the reorder point and the minimum cost.
2. a) In a private canteen, the daily demand for packet meals follows uniform distribution as presented below:

$$p(x) = \frac{1}{450 - 230}, 230 \leq x \leq 450$$

The cost of production per packet of meals is Rs.8. The selling price is Rs.16 per packet. The surplus packets on each day are sold at Rs. 6 per packet in a nearby public place. Find the optimum number of packets of meals to be prepared on each day.

- b) Find the optimum integer solution to the following all I.P.P  
Maximise  $z = x_1 + 2x_2$ , subject to the constraints:  
 $2x_2 \leq 7, x_1 + x_2 \leq 7, 2x_1 \leq 11$   
 $x_1, x_2 \geq 0$  and are integers

**Part B (Econometrics)**

3. Table below gives the bushels of corn per acre, Y, resulting from the use of various amounts of fertilizer,  $X_1$ , and insecticides,  $X_2$ , both in pounds per acre from 1971 to 1980.

Year	Y	$X_1$	$X_2$
1971	40	6	4
1972	44	10	4
1973	46	12	5
1974	48	14	7
1975	52	16	9
1976	58	18	12
1977	60	22	14
1978	68	24	20
1979	74	26	21
1980	80	32	24



- i) Fit an OLS regression to these observations
  - ii) Test for the individual significance of the parameter estimates
  - iii) Find the coefficient of multiple determination and interpret your result
  - iv) Find the partial correlation coefficients and indicate which independent variable contributes more to the explanatory power of the model.
  - v) Test for the overall significance of regression.
4. Table below gives the consumption expenditure ( Y ) and disposable income (X) for 30 families.

Consumption(in dollars)			Income
10600	10800	11100	12000
11400	11700	12100	13000
12300	12600	13200	14000
13000	13300	13600	15000
13800	14000	14200	16000
14400	14900	15300	17000
15000	15700	16400	18000
15900	16500	16900	19000
16900	17500	18100	20000
17200	17800	18500	21000

- i) Regress Y on X for the entire sample of observations
- ii) Regress Y on X , for small values of X and for large values of X by deleting 6 observations from the original data.
- iii) Test for heteroscedasticity using Goldfeld and Quandt test..

#### Part C(Demography)

5. The following data represent the distribution of the population (based on a random sample) of India by age and sex . Calculate
- i) age wise sex ratio.
  - ii) dependency ratio.
  - iii) overall sex ratio
  - iv) age sex pyramid

(6)

Age	Males	Females	Population
0-4	28763	26940	55703
5-9	32135	29430	61585
10-14	30359	27883	58242
15-19	25613	24761	50374
20-24	20722	22492	43264
25-29	19191	20751	39942
30-34	16422	16701	33123
35-39	16234	14985	31219
40-44	12560	11077	23637
45-49	10972	9761	20733
50-54	8310	7171	15481
55-59	6483	7602	14085
60-64	7164	7114	14278
65-69	4949	4706	9655
70-74	4216	3332	7548
75-79	1736	1428	3164
80-85	2135	1863	3998

- 6 The following data relate to the number of males, number of females, number of births and number of deaths at various age groups: 0-4, 5-9 .. which were obtained from the NFHS-2 data for India for 1996-98. Calculate CBR, ASFR<sub>x</sub>, TFR, GRR, CDR and ASDR<sub>x</sub>

Age	Male	Female	Births	Deaths
0-4	28763	26940		1019
5-9	32135	29430		123
10-14	30359	27883		70
15-19	25613	24761		106
20-24	20722	22492	2649	138
25-29	19191	20751	4723	124
30-34	16422	16701	2967	113
35-39	16234	14985	1152	116
40-44	12560	11077	420	116
45-49	10972	9761	89	160
50-54	8310	7171	29	201
55-59	6483	7602		190
60-64	7164	7114		388
65-69	4949	4706		328
70-74	4216	3332		1533
75-79	1736	1428		
80+	2135	1863		