

Fourth Semester M.Sc. Degree Examination, July 2013
Statistics
Paper 4.4 - Practical III

Time: Three Hours

Maximum Marks: 40

Answer three questions without omitting any part

Part A: Advanced Operations Research

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

Maximize $z = x_1 + 2x_2$, subject to the constraints:

$$2x_2 \leq 7, \quad x_1 + x_2 \leq 7, \quad 2x_1 \leq 11$$

$$x_1, x_2 \geq 0 \text{ and are integers}$$

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. The following table shows the personal savings(S) and personal income(X) of a country over a 31-year period.

S:	264	105	90	131	122	107	406	503	431
X:	8777	9210	9954	10508	10979	11912	12747	13499	14269
S:	588	898	950	779	819	1222	1702	1578	1654
X:	15522	16730	17663	18575	19635	21163	22880	24127	25604
S:	1400	1829	2200	2017	2105	1600	2250	2420	2570
X:	26500	27670	28300	27430	29560	28150	32100	32500	35250
S:	1720	1900	2100	2300					
X:	33500	36000	36200	38200					

- (i) Test for Heteroscedasticity using Goldfeld and Quandt test.
- (ii) If Heteroscedasticity is present, re-estimate the transformed model to correct for Heteroscedasticity.

Part C(Demography)

5. (a) From the following data, calculate (i) TFR (ii) GRR and (iii) NRR

Age group	15-19	20-24	25-29	30-34	35-39	40-44
No. of births (per 1000 women)	101	365	910	1011	605	203
No. of female births (per 1000 women)	50	180	450	500	300	100
No. of survivors out of each 1000 female children	850	800	750	700	650	600

(b) Compute (i) CDR(ii) ASDRs and (iii) STDRs, for Town X, taking population of town Y as the standard population (under direct as well as indirect method).

Age group	Town X		Town Y	
	Population	Deaths	Population	Deaths
Under 5	4586	34	4117	78
5-15	9912	31	8816	42
15-35	15205	60	14844	72
35-50	10460	183	10263	98
Over 50	21477	289	19889	138

(6) Construct the life table for the following data (ASDR for the age group 0-1 and 1-4 are 0.0167 and 0.0011 respectively)

Age group	0-4	5-9	10-14	15-19	20-24	25-29
Deaths	11353	1379	1022	2354	3298	3242
Population	2759472	2851210	3053991	3106710	3045578	2653761
Age group	30-34	35-39	40-44	45-49	50-54	55-59
Deaths	5047	6372	3557	5881	7566	9402
Population	2208682	1931569	1579321	1284361	1095689	967916
Age group	60-64	65-69	70+			
Deaths	15060	17250	82840			
Population	873476	685816	1000966			