

Fourth Semester M.Sc. Degree Examination, 2014
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) An owner in a firm wishes to stock some fashionable items for sale during the festival season. He has the following probability distribution of demand.

Demand	1	2	3	4	5	6
Probability	0.05	0.10	0.35	0.30	0.10	0.10

He pays Rs 230/- for each item and he sells each item for Rs. 400/-. The left over item at the end of the season are sold at a rate of Rs. 100/- each. Find the optimum number of items he should stock.

- (b) Obtain the optimal integer solution to the following LPP

$$\text{Maximize } Z = x - 3y$$

Subject to the constraints

$$x + y \leq 5,$$

$$-2x + 4y \leq 11,$$

$$x, y \geq 0.$$

and x and y are integers.

- 2 A large military installation stocks a special purpose vacuum tube for use in radar sets. The average annual demand for this tube is 1600 units. The tube must be made to order, and hence each time an order is placed it is necessary to go through a process of accepting bids and negotiating a contract. It is assumed that the cost of placing an order is \$4000. The installation uses an inventory carrying charge of \$10. It has been found that if a demand occurs when the system is out of stock. It is possible to obtain such a tube from a small stock carried at one of the manufacturers. The cost of shortage for the lost sale case (goodwill cost) amount to \$2000. The lead time demand is normally distributed with mean 750 units and standard deviation 50 units. Obtain the optimal order quantity and the reorder point.

PART B: ECONOMETRICS

3 The following data gives bushels of corn on per acre Y , resulting from the use of various amounts of fertilizer X_1 , and insecticide X_2 from 1991 to 2000.

Year	Y	X_1	X_2
1991	40	6	4
1992	44	10	4
1993	46	12	5
1994	48	14	7
1995	52	16	9
1996	58	18	12
1997	60	22	14
1998	68	24	20
1999	74	26	21
2000	80	32	24

- (i) Fit the OLS regression
- (ii) Test for the statistical significance of the slope parameters (regression coefficients).
- (iii) Find the adjusted and unadjusted coefficient of multiple determination
- (iv) Test for the over all significance of the regression
- (v) Find the partial correlation coefficients

4 Table below gives the consumption expenditure, C and disposable income D for 30 families.

	Consumption		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) Test for heteroscedasticity using Gold Feld –Quandt test.
- (ii) Correct for heteroscedasticity if it is present.

Part C: Demography

5. The following data represent the distribution of the population based on a random sample by age and sex.
Calculate i) Age wise sex ratio. ii) Dependency ratio for young, old and general taking 15-60 as working age group and iii) Overall sex ratio

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 are the data relating to the number of births, number of females, the number of births and the number of deaths at various age groups. Calculate (i) CBR(ii) Child Women ratio (iii) ASFRx, (iv) TFR (v) GRR (vi) NRR (vii) CDR m(iii) ASDRx

Age	Males		Females		Births	Deaths	Survival probability
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	0.920
25-29	19191		20751		4723	124	0.915
30-34	16422		16701		2967	113	0.905
35-39	16234		14985		1152	116	0.895
40-44	12560		11077		420	116	0.894
45-49	10972		9761		89	160	0.892
50-54	8310		7171			201	
55-59	6483		7602			190	
60-64	7164		7114			388	
65-69	4949		4706			328	
70-74	4216		3332			1533	
75-79	1736	8087	1428	6623			
80+	2135		1863				