Total No. of printed pages = 5

3 (Sem-5) STS M1 Pr

2019

STATISTICS

(Major Practical)

Paper : 5.5

Full Marks – 75

Pass Marks – 30

Time – Four hours

The figures in the margin indicate full marks for the questions.

GROUP – A

Question No. 4 is *compulsory*. Answer any *two* questions from the rest.

1. (a) The heights of six randomly chosen sailors are 63, 70, 68, 71, 68, 72. Those of 10 randomly chosen soldiers are 61, 62, 65, 66, 69, 69, 70, 71, 72 and 73. Discuss in the light of these data whether the sailors are on the average latter than the soldiers. 7

[Turn over

(b) The time taken by workers in performing a job by Method I and Method II is given below :

Method I :	20	16	26	27	23	22	25	30
Method II :	27	33	42	35	32	34	38	40

Do the data show that the variance of time distribution for population from which these samples are drawn do not differ significantly. 8

2. (a) For the following p:d.f

$$f(x) = \frac{\beta^{\alpha}}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}, \quad 0 \le x \le \infty$$

$$\alpha \ge 0, \ \beta > 0$$

Find the estimators of α and β by the method of moments where x takes values 2, 5, 9, 12 with sample size 4. 7

(b) The following table gives the number of flower heads f(x) each having x eggs laid by gall flies. The frequency distribution of x may be assumed to follow the truncated Poisson type, given by

$$f(x) = \frac{(e^{\theta} - 1)^{-1} \theta^{x}}{x!}, \quad x = 1, 2, \infty .$$

Estimate the parameter θ by MLE method and calculate the standard error of the estimate. 8

No. of eggs	1	2	3	4	5	6	7	8
No. of flower heads	24	21	16	13	8	6	3	1

3. Suppose N_i and C_i are the population size and cost per unit for the ith stratum (i = 1, 2, 3, 4, 5) in a crop survey. Obtain the optimum values of n_i and the corresponding variance of the estimate, if the population mean is to be estimated, given that the total approved cost of the survey is Rs. 5,000 and overhead cost is Rs. 500.

Also calculate the actual total cost of the sample.

Stratum No.	N_i	σ_i (in kg)	C_i (in Rs.)
1	3780	28·5	3·50
2	5260	18·6	2·75
3	8200	27·6	2·25
4	4160	27·2	3·00
5	2980	16·2	2·50

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4. (a) A population of 200 units is divided into 3 strata of sizes 60, 100, 40 respectively. The samples from these strata are given below : Find the S. F. of $\overline{Y}_{st}$.

Sample from 1st stratum	21	18	16	18	–
Sample from 2nd stratum	27	22	19	21	25
Sample from 3rd stratum	19	17	14	–	–

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(b) For a sample of 9 households selected from a locality of 150 households, monthly health expenditure and episode of ailment of its members are collected and shown below :

Sampled Household	Health Expenditure	Episode of Ailment
1	5675	5
2	7023	4
3	468	1
4	1735	2
5	6090	3
6	6389	7
7	9105	4
8	1900	2
9	3876	3

The average episode of ailment of household member is provided by the Public Health Centre of the locality as 3.

Estimate the average household monthly health expenditure of the locality along with mean square error of the estimate using regression method of estimation. 10

GROUP – B

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6. Viva voce. 5

7. Internal Assessment. 15