

Statistical Methods

Time : 3 Hours]

[Max. Marks : 40

Note : Attempt all five questions. Each question carries equal marks.

1. What is an Estimator? What are maximum likelihood estimators? Obtain maximum likelihood estimator for the parameter λ of a Poisson distribution with mean λ .

OR

- (a) When is an estimator said to be (i) Unbiased (ii) Sufficient.
(b) If X_1, X_2, \dots, X_n is a random sample from a Normal distribution

with mean m and known variance $\sigma^2 = K$, then show that $\sum_{i=1}^n X_i$

is a sufficient estimator for μ .

2. (a) Explain the procedure for testing a statistical hypothesis.
(b) Define the terms (i) Size of a test (ii) Power of a test.

OR

State and prove Neymann Pearson's fundamental lemma.

3. Define a Gamma distribution. State and prove its additive property.

OR

Following are 12 determinations of the melting point of a compound (in degrees Celsius) made by an analyst, the true melting point being 165 oC. Can you conclude from these data that his determinations are free from bias?

164.4	169.7	163.9	162.1	160.9	160.8
161.4	162.2	168.5	163.4	162.9	167.7

State the assumptions under which you test the hypothesis.

$(t_{0.025,11} = 2.201, t_{0.005,11} = 3.106)$.

4. Explain :
(a) Wilcoxon's Signed Rank Test.
(b) Run Test.

OR

What are Non-Parametric Tests? Discuss the various tests of hypotheses for contingency tables.

5. What is a Randomised Block Design (RBD) Explain the situation when RBD is the most appropriate design, write (i) the steps in analysis of RBD, and (ii) interpretation of the ANOVA table.

OR

Ten varieties of wheat are sown in 3 plots each, and following yields in number of bags per acre are obtained. Test the significance of difference between the mean variety yields. ($F_{.05, (9,20)} = 2.39$, $F_{.01, (9,20)} = 3.46$) :

Plot \ Variety	Variety										
	1	2	3	4	5	6	7	8	9	10	
1	7	7	14	11	9	6	9	8	12	9	
2	8	9	13	10	9	7	13	13	11	11	
3	7	6	16	11	12	5	12	11	11	11	
Total	22	22	43	32	30	18	34	32	34	31	298

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