KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Technology) 2020 Admission
III Semester Final Examination –March 2022

Beas.2108   Statistical Methods and Numerical Analysis (1+1)   Marks: 50
Time: 2 hours

I   **Define**   (10x1=10)
   1. Type I error
   2. Local control
   Fill in the blanks
   3. Test statistic for testing difference between two means in small sample is _____.
   4. If one regression coefficient is greater than unity other one should be _____.
   5. The First difference of a constant is _____.
   6. The modified Euler method is based on the average of _____.
   7. Repetition of treatments under investigation is known as _____.
   8. In a RBD Sum of Squares due to Error (S.S.E) = _____
   State True or False
   9. Degrees of freedom for error in one-way ANOVA are N-1.
   10. The process of computing the value of a function inside a given range is called extrapolation.

II   **Write short notes on ANY FIVE of the following**   (5x2=10)
   1. List the applications of t – test for small samples.
   2. Prove that the correlation coefficient between two variables is the geometric mean between two regression coefficients.
   3. Derive the total number of factorial effect in 2^n factorial experiment.
   4. What is inverse interpolation?
   5. State Simpson's one – third rule.
   6. What are the three basic principles of experimental design?
   7. Is 2 X2 Latin Square Design possible? Give reason.

III **Answer ANY FIVE of the following**   (5x4=20)
   1. Find the most likely price in Mumbai corresponding the price of Rs. 70 a Cochin from the following:

	Cochin	Mumbai
Average Price	65	67
Standard Deviation	2.5	3.5

   Correlation coefficient between the price of fertilizers in the two cities is 0.8.

   2. Pumpkins were grown under two experimental conditions. Two random samples of 11 pumpkins collected from first experimental condition and 9 pumpkins collected from second experimental condition show the sample standard deviation of weights as 0.8 and 0.5 respectively. Assuming that the weight distribution are normal, test the hypothesis that the true variances are equal, against the alternative that they are not, at the 90 % level. [Assume that $P(F_{10,8} \geq 3.35) = 0.05$]
   3. List the assumptions for ANOVA.

4. Using a polynomial of the third degree, complete the record given below of the export of a certain commodity during five years:

Year :	2017	2018	2019	2020	2021
Export (in tons) :	443	384	–	397	467

5. Using trapezoidal rule, find $\int_0^6 f(x)\,dx$ from the following set of values of x and $f(x)$

x :	0	1	2	3	4	5	6
$f(x)$:	1.56	3.64	4.62	5.12	7.08	9.22	10.44

6. Show the ANOVA table of Latin Square Design.

7. Consider the results given in the following table for an experiment involving six treatments in four randomized blocks.

Blocks	Treatments					
	(1)	(2)	(3)	(4)	(5)	(6)
1	24.7	20.6	27.7	16.2	16.2	24.9
2	27.3	28.8	22.9	15.0	17.0	22.5
3	38.5	39.5	36.8	19.6	15.4	26.3
4	28.5	31.0	34.9	14.1	17.7	22.6

IV   **Write an essay on ANY ONE of the following**   (1x10=10)

1. Prove that the solution of equation $\frac{dy}{dx} + y = 0$; $y_0 = 1$, by Runge – Kutta method of the second order is $y_m = (1 - h + \frac{h}{2})^m$

2. An experiment was planned to study the effect of sulphate of potash and super phosphate on the yield of potatoes. All the combinations of 2 levels of super phosphate (p_0 and p_1) and two levels of sulphate of potash (k_0 and k_1) were studied in a randomized block design with 4 replications for each. The yields (lb.per plot) obtained are given below:

Block	Yields (lbs per plot)			
I	(1)	k	p	kp
	23	25	22	38
II	p	(1)	k	kp
	40	26	36	38
III	(1)	k	pk	p
	29	20	30	20
IV	kp	k	p	(1)
	34	31	24	28

Analyze the data and give your conclusion.

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