KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agrl. Engg.) 2020 Admission
III Semester Final Examination-March 2022

Sacs.2110 **Engineering Mathematics III (2+1)** **Marks: 50**
Time: 2 hours

(10x1=10)

I **Fill in the blanks**

1. Laplace transform of (e^{at}) is .....
2. The iterative formula of Euler's method for solving $y' = f(x, y)$ with $y(x_0) = y_0$ is .....
3. The forward difference operator Δ in terms of shift operator E is given by .....
4. Interpolation is the technique of estimating the value of a function for any .....
5. The median of the numbers 11, 10, 12, 13, 9 is .....

State True or False

6. Runge-Kutta method is a self starting method.
7. $\Delta + \nabla = E - E^{-1}$
8. Standard Deviation is defined as $\sigma = \sqrt{\left[\frac{\sum f_i(x_i - \bar{x})^2}{N}\right]}$
9. If the correlation coefficient is 0, the two regression lines are perpendicular.
10. The Chi-square distribution is continuous.

(5x2=10)

II **Write short notes on ANY FIVE of the following**

1. Find the Laplace transform of $cos^2 2t$?
2. Write down Newton's forward interpolation formula?
3. Explain Simpson's rule of numerical integration?
4. Ten participants in a contest are ranked by two judges as follows:

x	1	6	5	10	3	2	4	9	7	8
y	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient.

5. What is the probability density function of Normal distribution?
6. What is a sample space?
7. What is mean by Correlation?

(5x4=20)

III **Answer ANY FIVE of the following.**

1. Find the value of $\int_0^1 \frac{dx}{1+x^2}$ taking 5 subintervals by Trapezoidal rule correct to 5 significant digits. Compare it with the exact value.
2. Using Lagrange interpolation formula, find the value of y corresponding to x=10 from the following table.

x	5	6	9	11
f(x)=y	12	13	14	16

3. Find by Taylor's series method the value of y at x=0.1 and x=0.2 to five decimal places from $dy/dx = x^2y - 1, y(0)=1$.
4. Apply Bessel's formula to obtain y_{25}, given $y_{20} = 2854, y_{24} = 3162, y_{28} = 3544, y_{32} = 3992$.

5. If a random variable has the standard normal distribution, find the probability that it will take on a value
   (a) between 0 and 2.3.
   (b) between 1.22 and 2.43.
6. In experiments on pea breeding' the following frequencies of seeds were obtained:

Round and yellow	Wrinkled and yellow	Round and green	Wrinkled and green	Total
315	101	108	32	556

Theory predicts that the frequencies should be in proportions $9:3:3:1$. Examine the correspondence between theory and experiment by means of $\chi^2 -$ distribution.

7. The following data gives the frequency distribution of the wages of 72 laborers in a factory. Find the mean deviation about the Arithmetic mean.

Wages	13-17	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57
Laborers	2	22	19	14	3	4	6	1	1

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

1. Solve the Initial value problem $y' = x + y, y(0) = 0$ choosing h=0.2 using Runge-Kutta method computing three steps.
2. Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

x	0	1	2	3	4. .
f	419	352	154	56	19

****