Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF AGRICULTURE

B.Tech. (Agriculture/Dairy Technology) Winter 2019 - 20 Examination

Semester:3 **Date: 27/11/2019**
Subject Code: 20103203 **Time: 10.30 am To 12.30 pm**
Subject Name: Engineering Mathematics - III **Total Marks: 50**

Instructions
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1

A) Fill in the blanks (Each of 0.5 Mark) **(05)**

i) The relationship between E and Δ is _____.

ii) Let h be the finite difference, then forward difference operator is defined by ___.

iii) The Newton's quadrature formula for $n = 1$represents _____ rule.

iv) The trapezoidal rule of integration for the two-segment is exact for integrating at most _____ order polynomials.

v) A Unit step function is defined as _____.

vi) The Laplace transform of L{t} is _____.

vii) The null hypothesis contains a statement of _____.

viii) For the _____distribution, the observation closer to middle will occur with increasing frequency.

ix) Relation between mean, median and mode is _____.

x) The value of correlation coefficient is between ___ and_____.

B) Multiple Choice Questions (Each of 0.5 Mark) **(10)**

i) Newton forward interpolation formula is used for _____ intervals.

a)	open	b)	Unequal
c)	equal	d)	Closed

ii) Δ^2 is called the ___order difference operator.

a)	first	b)	Second
c)	third	d)	Fourth

iii) The shifting operator is denoted by _____.

a)	E	b)	ω

c)	∇	d)	T

iv) The value of $(1-\nabla)(1+\Delta)$ is _____.

a)	$\nabla+\Delta$	b)	1
c)	E	d)	$None of these$

v) The mean of 6, 5, 3,2,9 is_____

a)	5	b)	4
c)	3	d)	2

vi) In Simpson's $3/8^{th}$ rule, the number of intervals (n) should be multiple of _____.

a)	3	b)	1
c)	2	d)	None of these

vii) The Runge-Kutta method of second order is the _____method.

a)	Euler method	b)	modified Euler
c)	Taylor's method	d)	None of these

viii) The Gaussian quadrature formula for three point is exact for polynomials up to _____ degree.

a)	1	b)	3
c)	5	d)	4

ix) Which of the following function does not have Laplace Transform?

a)	$g(t)=t^2$	b)	$g(t)=e^{t^2}$
c)	$g(t)=\frac{\sin t}{t}$	d)	None of these

x) $L^{-1}\left\{\frac{1}{s(s^2+1)}\right\}$ is _____.

a)	$1+\sin t$	b)	$1-\sin t$
c)	$1+\cos t$	d)	$1-\cos t$

xi) $L\{\delta(t-a)\}$ is _____.

a)	e^{-as}	b)	e^{as}
c)	e^{-as^2}	d)	None of these

xii) The Laplace transform of 1 is _____.

a)	$\frac{1}{s}$	b)	$\frac{1}{s^2}$
c)	$-\frac{(-1)^2}{s}$	d)	None of these

xiii) A statement about population developed for the purpose of testing is called _____.

a)	Hypothesis	b)	Hypothesis testing
c)	Level of significance	d)	Test- statistic

xiv) Any statement whose validity is tested on the basis of a sample is called _____.

a)	Null hypothesis	b)	Alternative hypothesis
c)	Statistical hypothesis	d)	simple hypothesis

xv) A hypothesis may be classified as _____.

a)	Simple	b)	Composite
c)	Null	d)	All of the above

xvi) The alternative hypothesis is also called _____.

a)	Null hypothesis	b)	Research hypothesis
c)	Statistical hypothesis	d)	simple hypothesis

xvii) The equation of regression lines $y = 0.5x + a$ and $x = 0.4y + b$. The correlation coefficient is _____.

a)	$\sqrt{0.2}$	b)	0.45
c)	$-\sqrt{0.2}$	d)	None of these

xviii) The median of the numbers 11,10,12,13 and 9 is _____.

a)	12.5	b)	12
c)	10.5	d)	11

xix) The correlation coefficient r is independent of change of _____.

a)	Origin and Scale	b)	Origin
c)	Scale	d)	None of the above

xx) If $r = 0$, the two variables are _____.

a)	Linearly independent	b)	Linearly dependent

c)	Positive correlation	d)	Negative correlation

Q.2

A) Define the following (Any five out of seven questions) (05)

(1) Write the Newton's Forward interpolation formula.
(2) Write the Newton's divided difference formula.
(3) Write the formula of the Taylor series and modified Taylor series.
(4) What is the Laplace transform of $\cosh at$?
(5) State first shifting theorems for the Laplace transform.
(6) Define test of significance.
(7) The angle between two regression lines is given by _____.

B) Answer the following (Any five out of seven questions) (05)

(1) Write the Newton's Backward interpolation formula.
(2) Prove the $E = 1 + \Delta$.
(3) State Euler and modified Euler formula.
(4) Find $L^{-1}\left\{\frac{1}{s+7}\right\}$.
(5) Find $L(t^2 + \sin 2t - 2e^{-t})$
(6) Write the formula for spearmans correlation.
(7) Define Karl Pearson's correlation coefficient.

Q.3 Write Short notes(Any five out of six questions) (10)

(1) Construct the table using Newton's divided difference formula for the following data:

x:	1	2	4	10
f(x):	10	15	67	430

(2) Find the value of y for $x = 0.1$ by Picard's method, given that $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$.

(3) Apply Runge's method to find an approximate value of y when $x = 0.2$, given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

(4) Find the value of $1 * t$.

(5) What are degrees of freedom of $\bar{x}$, s^2 and correlation coefficient?

(6) Find the equation of regression lines from the following data and also estimate y for x=1.

x	3	2	-1	6	4	-2	5	7
y	5	13	12	-1	2	20	0	-3

Q.4 Long Questions (Any three out of four questions) (15)

(1) Find $f(14)$using Gauss backward formula:

x	0	5	10	15	20	25
$y = f(x)$	7	11	14	18	24	32

(2) Evaluate f(9), using Newton's divided difference formula for the given values

x:	5	7	11	13	17
f(x):	150	392	1452	2366	5202

(3) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule, (iii) Gauss Formula for $n = 2$ and $n = 3$.

(4) Using Laplace transformation solve the initial value problem

$$y'' + 2y' + 5y = e^{-t}\sin t\,, \qquad y(0) = 0\,, y'(0) = 1$$