Hall Ticket Number:

Code No. : 14163 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Main & Backlog Examinations, July-2023

Numerical Methods, Probability and Statistics

(Common to Civil, EEE & Mech.)

Time: **3 hours** Max. Marks: **60**

Note: Tables of Area under the normal curves, t-test, F-test & Chi-square test will be provided

*Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Give the Newton's interpolation formula? Can we use it for unequally spaced intervals?	2	2	1	1,2,12
2.	Find p for the following data if f(0.2) is asked x: 0, 1, 2, 3, 4, 5, 6 f(x): 176, 185, 194, 203, 212, 220, 229	2	2	1	1,2,12
3.	Write a Euler's formula to solve ordinal differential equation of first order.	2	1	2	1,2,12
4.	State Newton's backward interpolation formula for first and second derivative at $x = x_0$	2	1	2	1,2,12
5.	Define discrete random variable. Give an example.	2	1	3	1,2,12
6.	Define continuous random variable. Give an example.	2	1	3	1,2,12
7.	Define the F-test formula and when to use it?	2	2	4	1,2,12
8.	Explain chi-square test.	2	1	4	1,2,12
9.	Explain the principle of least squares.	2	2	5	1,2,12
10.	Define positive and negative correlation.	2	1	5	1,2,12
	Part-B (5 × 8 = 40 Marks)				
11. a)	Find the solution of x = 1925 using Newton's backward Difference formula x: 1891, 1901, 1911, 1921, 1931 y: 46, 66, 81, 93, 101	4	3	1	1,2,12
b)	Find the Solution of x = 301 using Lagrange's Interpolation formula x: 300, 304, 305, 307 y: 2.4771, 2.4829, 2.4843, 2.487	4	3	1	1,2,12
12. a)	Solve $y' = x + y$, $y(0) = 1$ by Taylor's series method. Hence find the values of y at x = 0.1 and x = 0.2	4	3	2	1,2,12
b)	Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with initial condition y = 1 at x = 0; find y for x = 0.1 by Euler's method $h = 0.025$	4	3	2	1,2,12
13. a)	Most graduate schools of business require applicants for admission to take the Graduate Management Admission Council's GMAT examination. Scores on the GMAT are roughly normally distributed with a mean of 527 and a standard deviation of 112. What is the probability of an individual scoring above 500 on the GMAT?	4	3	3	1,2,12

Contd... 2

b)	A random variable X has the following probability distribution.	4	2	3	1,2,12

$X=x_i$	0	1	2	3	4	5	6
$P(X=x_i)$	c	$3c$	$5c$	$7c$	$9c$	$11c$	$13c$

Find c and $P(0 < X < 4)$.

14. a)	Define Null hypothesis, alternative hypothesis, Type-I and Type-II errors.	4	1	4	1,2,12
b)	A random sample of 10 boys had the following I.Q.: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100. Do these data support the assumption of a population mean I.Q. of 100? Test at 5% level of significance.	4	3	4	1,2,12
15. a)	Fit a second order polynomial to the following data	4	2	5	1,2,12

x	0	0.5	1.0	1.5	2.0	2.5
y	0	0.25	1.0	2.25	4.0	6.25

b)	Find the coefficient of correlation from the following data:	4	3	5	1,2,12

x	78	89	97	69	59	79	68	57
y	125	137	156	112	107	138	123	108

16. a)	Use Lagrange's formula, to find the quadratic polynomial that takes the values	4	3	1	1,2,12

x	0	1	3
F(x)	0	1	0

b)	Find by Runge-Kutta method, the values of y at $x = 0.1$ to four decimal places from $\frac{dy}{dx} = x^2y - 1$ with $y(0) = 1$.	4	3	2	1,2,12
17.	Answer any ***two*** of the following:				
a)	Explain the different types of Probability Distribution Functions? How to find expectation and variance of each PDF?	4	2	3	1,2,12
b)	Two random samples of sizes 7 and 6 gave the following values of the variable.	4	3	4	1,2,12

Sample 1: 28 30 32 33 33 29 34

Sample 2: 29 30 30 24 27 29

Test the difference of the estimates of the population variances at 5% level of significance.

c)	Fit a simple straight line y= a+bx using below data.	4	2	5	1,2,12

x	1	2	3	4	5	6	7
y	0.5	2.5	2.0	4.0	3.5	6.0	5.5

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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