Hall Ticket Number:

Code No. : 14122

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (CBCS) IV-Semester Main Examinations, January-2021 Numerical Methods, Probability and Statistics

(Common to Civil, EEE & Mech.)

Time: 2 hours

Max. Marks: 60

Note: Answer any NINE questions from Part-A and any THREE from Part-B Part-A ($9 \times 2 = 18$ Marks)

Q. No.	Stem of the question	Μ	L	СО	PO
1.	Evaluate $\Delta^2(e^x)$, taking $h = 1$.	2	2	1	1,12
2.	Find the second divided difference of $f(x) = \frac{1}{x}$ using the points a, b, c .	2	2	1	1,12
3.	Write the expressions for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ using Newton's backward	2	1	2	1,12
	interpolation formula.		ab I		
4.	Using Euler's method, find the approximate value of $y(0.1)$ for the initial value problem $y' = x^2 + y^2$, $y(0) = 1$.	2	3	2	1,12
5.	Define discrete and continuous random variables with an example.	2	1	3	1,12
6.	If the probability density function of a continuous random variable X is $f(x) = ae^{- x }, -\infty < x < \infty$, then find the value of a .	2	2	3	1,12
7.	Define (i) null hypothesis and (ii) alternate hypothesis.	2	1	4	1,12
8.	Write short note on type I and type II errors.	2	1	4	1,12
9.	Test whether the equations $x = 4y + 5$ and $y = \frac{1}{8}x + 4$ represent	2	2	5	1,12
10.	valid regression lines. Show that the coefficient of correlation is the geometric mean of regression coefficients.	2	2	5	1,12
11.	State Lagrange's interpolation formula.	2	1	1	1,12
12.	Write Runge-Kutta method of fourth order formula.	2	1	2	1,12
	Part-B (3 × 14 = 42 Marks)				
13. a)	Find $f(x)$ by Newton's forward and backward interpolation formulae from the following data:	7	3	1	1,12
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				
b)	If $y_1 = 168$, $y_7 = 192$, $y_{15} = 336$, then find y_{10} using Lagrange's interpolation formula.	7	3	1	1,12

	Find	$\frac{dy}{dx}$	and -	$\frac{d^2 y}{dx^2} =$	at $x =$	=0.0 fr	om the i	followi	ng data	.:			7	2	2	1,12
			x:	0.0	0.2	0.4	0.6	0.8	1.0							
			y:	0.0	0.12	0.48	1.10	2.0	3.20							
b)		-					nd the a $y - 1, y(0)$	-	mate va	alue	of y(0.	.1)	7	3	2	1,12
5. a)	A rar	ndom	variat	ole X	has th	e follow	ving pro	babilit	ty distri	butic	on.		7	2	3	1,12
			X:	0		1	2 3	4	4							
			P(X):	3k	3	k I	K 21	x 6	k							
	Find	(i) k	(ii) H	E(X)	(iii) V	ar(X)	(iv) P(.	X < 2)								
b)	1	lard	deviatio				lly dist abilities					nd ii)	7	3	3	1,1
.6. a)	Ara	ndor	n samp	le of	7 stud	ents had	l the fol	lowing	g I.Q's:			n de	7	4	4	1,1
	85, 9	96, 1	05, 102	2, 82, 8	89, 90.											
						claim o	f a pop	ulation	mean	of I	Q 100)?				
	Iest	at 5%	6 level	of	signi	ficance										
b)	Two from	sam thei	ples of r respe	f sizes ective	9 and means	1 8 give s equals	the su to 160 same r) and	91 resp	ectiv	ely. C	1	7	4	4	1,1
	Two from these Use	sam thei be r the n	ples of r respe egarde	f sizes ective d as d	9 and means rawn f	d 8 give s equals from the	e the su s to 160) and (91 resp popula	ectiv tion?	vely. C	an	7 7	4	4	
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17. a)	Two from these Use follo	sam thei be r the n wing	ples of r respe- regarde nethod g data: x: y: y: e the co	f sizes ective d as d of leas 0	9 and means rawn f st squa 2 1 5	1 8 gives s equals from the ares to f 5 12	e the su s to 160 e same r it a strain 7 20 ion betw) and some of the second secon	91 resp popula a $y = a$	pective tion? a+bx	for th	an	7			1,1 1,1 1,1
17. a)	Two from these Use follo	sam thei be r the n wing	ples of r respe- regarde nethod g data: y: y: e the co g data:	f sizes ective d as d of leas 0 - - oefficio	9 and means rawn f st squa 2 1 5 ent of	1 8 give s equals res to f 5 12 correlat 4	e the su s to 160 e same r it a strain 7 20 ion betw	and sormal sormal sormal sormal sormal sormal sormal sortage week sortage week sortage	91 resp popula as $y = a$ K and 8	Y frc	for the	an	7			1,1
17. a)	Two from these Use follo	sam thei be r the m wing npute wing X Y	ples of r respe- regarde nethod g data: y: the co g data: 1 12	f sizes ective d as d of leas 0 - - oefficio 2 11	9 and means rawn f st squa 2 1 5 ent of 3 13	1 8 gives equalsirom theares to f512correlat41515	e the su s to 160 e same r it a strai 7 20 ion betw 5 6 6 4	and sormal sormal sormal sormal sormal sormal sormal sortage week sortage week sortage	91 resp popula as $y = a$ K and 8	$\frac{1}{9}$	for the	an	7			1,1
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17. a)	Two from these Use follo Con follo	sam thei be r the m wing mpute wing X Y	ples of r respe- regarde nethod g data: y: y: e the co g data: 1 12 12 nd the r	f sizes ective d as d of leas 0 - - oefficio 2 11 -	9 and means rawn f st squa 2 1 5 ent of 3 13 sion lin ded di	1 8 gives s equals from the ares to f 5 12 correlat 4 15 15 ne of x of fference	e the su s to 160 e same r it a strai 7 20 ion betw 5 6 6 4	and the formal light line ween 2	91 resp popula ie $y = a$ K and 8 5 19	Y fro	om the	ne	7			1,1 1,1
17. a) b)	Two from these Use follo Con follo Also Usi	sam thei be r the m wing npute wing X Y y , fin ng N	ples of r respe- regarde nethod g data: y: y: e the co g data: 1 12 nd the r lewton 4	f sizes ective d as d of leas 0 - 0 efficio 2 11 regress 2 s divi	9 and means rawn f st squa 2 1 5 ent of 3 13 sion lin ded di th 5	4 5 12 correlat 4 15 15 16 17 17	e the su s to 160 e same r it a strain 7 20 ion betw 6 6 4 17 on y. e formu ving dat	and the formal second s	91 resp popula as $y = a$ K and 8 5 19 I f(8) ar 11	Y fro	om the	m	7 7	2	5	1,1
17. a) b)	Two from these Use follo Con follo Also Usi	sam thei be r the n wing npute wing X Y y o , fin ng N x: x):	ples of r respe- regarde nethod g data: y: y: e the co g data: 1 12 nd the r lewton ² 4 4	f sizes ective d as d of lea: 0 - - oefficio 2 11 regress 's divi	9 and means rawn f st squa 2 1 5 ent of 3 13 sion lin ded di th 5 100	4 5 12 correlat 4 15 15 15 16 17 18 19 19 10 10 11 12 13 14 15 17 18 19 19 10 10 11 12 13 14 15 17 18 19 19 10 10 10	e the su s to 160 e same r it a strain 7 20 ion betw 6 6 4 17 on y. e formu ving dat	and the formal second s	91 resp popula as $y = a$ K and 8 5 19 I f(8) ar 11 121	Y fro	rely. C for the om the 2) 13 2028	m	7 7	2	5	1,1 1,1

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19.	Ar	nswer any two	of the followin	ig:		A Remains etc.				
a)		X is a discrete andVar (aX+b	7	2	3	1,12				
b)	In experiments on pea breeding, the following frequencies of seeds were obtained:								4	1,12
		Round and Yellow	Wrinkled and Yellow	Round and Green	Wrinkled and Green	Total				
		315	101	108	32	556				
c)_	Theory predicts that the frequencies should be in 9:3:3:1. Examine the correspondence between theory and experiment. If $x = 4y+5$ and $y = kx+4$ are the regression lines of x on y								5	1,12
		and y on x respectively x and \overline{y} .								

M:	M	r	VC'
TAT*	TATC	111	10,

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	44.88
2	Knowledge on application and analysis (Level-3 & 4)	55.12
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable, subject to a maximum of 10%)	0

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