Code No.: 14164 AS N

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Advanced Supplementary Examinations, Aug./Sept.-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 $(10 \times 2 = 20 \text{ Marks})$

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Pro	e th	at $\Delta = E$												PO
				tion for	mula						2	2	1	1,2,1
							1.				2	1	1	1,2,1
			~0									1	2	1,2,1
Usin valu	g Eu	oblem $\frac{dy}{dx}$	ethod, find $= y + e^x$	the ap $y(0) =$	prox	imate va	alue o	of y(0	.2) for t	he initia	1 2	2	2	1,2,1
Defi	ne D	iscrete aı	nd continu	ous ran	ndom	variable	e.				1			
Defin	ne N	ormal dis	stribution.									1		1,2,12
Defin	e ty	pe-I and	type-II err	ors.							1	1	3	1,2,12
					e test							1	4	1,2,12
Write	the	princip	le of leas	t squar	0 1031	 ad tha					2	2	4	1,2,12
parab	ola.		or ious	· squar	es ai	id the r	iorma	l equ	ations to	fit the	2	2	5	1,2,12
Defin	e Co	rrelation	and coeff	icient o	of cor	relation	1890				12			
Aug.											2	1 2 10	3	1,2,12
	-,	on one	0.7071, si 5° using N	n 50° = ewton'	= 0.7 s for	660, sin	55° mula.				4	3	1	1,2,12
Obtain find f	the (6):	Newton	's divided	differe	nce i	nterpola	tion p	olyno	mial and	hence	4	3	1	1,2,12
		X	3	etild b	7	9	in a such	10	ia skor		nét Sn			
		f(x) 16	8	120	72		63			100 U.S.			
Find $\frac{d}{d}$	and	$\frac{d^2y}{dx^2}$ at :	x = 1.25	from the	e foll	lowing to	able.	1,000		en en en en En en	4	3	2	1,2,12
X	1	1.05	1.10	1.15	10	1.20	13	25	1 30	rang.				
у	1	1.025	1.049	1.072	,									
								9	1.140					
Using $y(0) =$	Rung 1 at	ge - Ku $x = 0.2$	itta metho	od of f	ourth	order,	solve	$\frac{dy}{dx}$	$=\frac{y^2-x^2}{y^2+x^2}$	with	4	3	2	1,2,12
A rando	m va	ariable X	has the fo	ollowin	g pro	bability	distr	hutio	a contract	a field a		ores et		
		X=Xi	0	1		2	3	1		Berol El	4	2	3	1,2,12
		P(X=xi) c	20		3 <i>c</i>	$2c^2$	5c						
	Prov Write State deriv Usin value Defin Defin Write Write Parab Defin Given 0.866 Obtain find f	Prove the Write Lastate Noderivative Using Envalue production Define Doefine Doefine Noderivative Write the Write the Write the parabola. Define Confidering Confidering Confidering for the find $f(6)$: Find $\frac{dy}{dx}$ and $\frac{dy}{dx}$ a	Prove that $\Delta = E$ Write Lagrange's State Newton's derivative at $x =$ Using Euler's me value problem $\frac{dy}{dx}$ Define Discrete at Define Normal distriction Define type-I and Write the applicate Write the princip parabola. Define Correlation Given $\sin 45^\circ = (0.8660, \text{ find } \sin 46^\circ)$ Obtain the Newton find $f(6)$:	Prove that $\Delta = E - 1$. Write Lagrange's interpolar State Newton's forward derivative at $x = x_0$ Using Euler's method, find value problem $\frac{dy}{dx} = y + e^x$ Define Discrete and continual Define Normal distribution. Define type-I and type-II error Write the applications of Ch. Write the principle of least parabola. Define Correlation and coeff. Paragram Given $\sin 45^\circ = 0.7071$, $\sin 0.8660$, find $\sin 46^\circ$ using N. Obtain the Newton's divided find $f(6)$: $x = 3$ $f(x) = 160$ Yeight $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.25$ $\frac{dy}{dx} = 1.05$ $\frac{dy}{dx} = 1.05$ Using Runge — Kutta method $f(6) = 1$ Find $f(6) = 1$ Using Runge — Kutta method $f(6) = 1$ A random variable X has the form $f(6) = 1$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation for State Newton's forward interpolative at $x = x_0$ Using Euler's method, find the apvalue problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$ Define Discrete and continuous rand Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square Write the principle of least square parabola. Define Correlation and coefficient of the Part-B (5): Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.8660$, find $\sin 46^\circ$ using Newton's Obtain the Newton's divided different find $f(6)$: $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula State Newton's forward interpolation derivative at $x = x_0$ Using Euler's method, find the approximate value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test Write the principle of least squares at parabola. Define Correlation and coefficient of comparabola. Define Type-I and type-II errors. Write the principle of least squares at parabola. Define Correlation and coefficient of comparabola. Define Correlation and coefficient of comparabola. Define Type-II errors. Write the principle of least squares at parabola. Define Correlation and coefficient of comparabola. Find $\frac{dy}{dx}$ and $\frac{d5^\circ}{dx} = 0.7071$, $\sin 50^\circ = 0.70.8660$, find $\sin 46^\circ$ using Newton's form the Newton's divided difference in find $f(6)$:	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation form derivative at $x = x_0$ Using Euler's method, find the approximate value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the reparabola. Define Correlation and coefficient of correlation Part-B (5×8 = 40 Mark). Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 0.8660$, find $\sin 46^\circ$ using Newton's forward for Obtain the Newton's divided difference interpolatind $f(6)$: $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula derivative at $x = x_0$ Using Euler's method, find the approximate value of value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal parabola. Define Correlation and coefficient of correlation. Part-B (5×8 = 40 Marks) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8660$, find $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation principle of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.25$ from the following table. X 1 1.05 1.10 1.15 1.20 1.2 Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.25$ from the following table. Using Runge – Kutta method of fourth order, solve $y(0) = 1$ at $x = 0.2$. A random variable X has the following probability districtions are the solution of the properties of the p	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula for formula derivative at $x = x_0$ Using Euler's method, find the approximate value of $y(0)$ value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal equal parabola. Define Correlation and coefficient of correlation. Part-B (5×8 = 40 Marks) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.800$, $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.800$, $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation polynominate find $f(6)$: $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula for first and derivative at $x = x_0$ Using Euler's method, find the approximate value of $y(0.2)$ for the value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal equations to parabola. Define Correlation and coefficient of correlation. Part-B $(5 \times 8 = 40 \text{ Marks})$ Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 0.8660$, find $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation polynomial and find $f(6)$: $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula for first and second derivative at $x = x_0$ Using Euler's method, find the approximate value of $y(0.2)$ for the initial value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal equations to fit the parabola. Define Correlation and coefficient of correlation. Part-B (5×8 = 40 Marks) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation polynomial and hence find $f(6)$: $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula for first and second derivative at $x = x_0$ Using Euler's method, find the approximate value of $y(0.2)$ for the initial value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal equations to fit the parabola. Define Correlation and coefficient of correlation. Part-B (5×8 = 40 Marks) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation polynomial and hence find $f(6)$: $x = 3 = 7 = 9 = 10$ $f(x) = 1.10 = 1.15 = 1.20 = 1.25 = 1.30$ y 1 1.025 1.049 1.072 1.095 1.118 1.140 Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $\frac{dy}{dx} = \frac{dy}{dx} =$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula for first and second derivative at $x = x_0$ Using Euler's method, find the approximate value of $y(0.2)$ for the initial value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal equations to fit the parabola. Define Correlation and coefficient of correlation. Part-B (5×8 = 40 Marks) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation polynomial and hence find $f(6)$: $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Prove that $\Delta = E - 1$. Write Lagrange's interpolation formula. State Newton's forward interpolation formula for first and second derivative at $x = x_0$ Using Euler's method, find the approximate value of $y(0.2)$ for the initial value problem $\frac{dy}{dx} = y + e^x$, $y(0) = 0$. Define Discrete and continuous random variable. Define Normal distribution. Define type-I and type-II errors. Write the applications of Chi-square test. Write the principle of least squares and the normal equations to fit the parabola. Define Correlation and coefficient of correlation. Part-B (5×8 = 40 Marks) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 46^\circ$ using Newton's forward formula. Obtain the Newton's divided difference interpolation polynomial and hence find $f(6)$: $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

b) I	lf X i	s a co	ntinuo	us rar	dom	variable	e with	prob	ability	density fun	ction	4	2	3	1,2,12
1	given 1	by $f(x)$	= $=$ $=$	kx, 2k, -kx +	$0 \le x$ $2 \le x$ $6k, 4$	< 2 < 4 $\le x < 1$, then	n find	k and m	ean of X.					
a)	A rand	dom sai	mple o	f 10 b	oys ha	ad the fo	ollowi data	ing I.C).: 70, 1	20, 110, 10 assumption	1, 88, of a	4	3	4	1,2,12
b)		random								ng values o	of the	4	3	4	1,2,12
1		le 1: 55	49	9 6	5	60 5	6	59	54						
	Samp	le 2: 45	69	35				57	3535	48					
		he diffe		of the	estim	nates of	the p	opulat	ion vari	ances at 5%	level				
a)	Find t	the stra	ight lir	ne that	best f	its the f	ollow	ing da	ta			4	2	5	1,2,12
	X	1	2	3		4	5	- 47	in areas						
	y	0.25	0.42	2 0.	56	0.72	1								
b)		the coe	fficien	t of co	rrelati	ion fron	n the f	follow	ing data			4	3	5	1,2,12
"	X	78	90	97	70	60	79	68	58						
	у	125	136	155	111	106	137	122	108						
								1	100		1				
2)	100000000000000000000000000000000000000									vard interpo	lation	4	3	1	1,2,12
. a)	Find	f (43) 1								vard interpo	lation	4	3	1	1,2,12
. a)	Find	f (43) 1 ula:	from th	ne folk	owing	data us	ing No		's backv	vard interpo	lation	4	3	1	1,2,12
. a)	Find form	f (43) 1 ula:	from the	ne follo	owing 0	data us	ing No	ewton 45	's backy	vard interpo	lation	4	3	1	1,2,12
	Find form	f (43) 1 ula:	From th	5 3 32 2	owing 0	data us 35 260	ing No.	45 20	s backv			4	3	2	
b)	Find form x f(x) Find	f (43) fula: 20 35 by Ta	from the 25 34 35 ylor's	ne follo	owing 0 91 metho	data us 35 260 od, the	40 231 values	ewton 45	's backy	vard interpo 0.1 and $x = 0.1$					
b)	Find form x f(x) Find four	f (43) 1 ula: 20 35 by Ta decima	from the 25 state of the 25 st	ne follo	owing 0 91 method $\frac{dy}{dx} = \frac{dy}{dx}$	data us 35 260 od, the $= x^2y - 1$	40 231 values	ewton 45	's backy						
b)	Find form x f(x) Find four Answ	f (43) fula: 20 35 by Taidecima	from the 25 state of the 25 st	ne follows a series series from the f	owing 0 91 method $\frac{dy}{dx} = 0$ follow	data us 35 260 od, the $= x^2y$ — ing:	40 231 values 1 with	45 20 3 of y th y(0)	is backv 3 3 4 3 4 4 4 4 4 4 4 4 4 4	0.1 and $x =$	= 0.2 to				1,2,12
	Find form x f(x) Find four Ansy	f (43) 1 ula: 20 35 by Ta decima wer any	from the state of	ne follows a series from of the fundard	owing 0 91 method $\frac{dy}{dx} = 0$ follow deviate excitive	data us 35 260 od, the $= x^2y$ — ing: tion of the standard st	ing No. 231 values 1 with	45 20 3 of y th y(0) arks ob	is backy $at x = 0$ $at x = 0$ Assuming	0.1 and $x =$ by 1000 studies the norm	e 0.2 to	4	3	2	1,2,12
b)	Find form x f(x) Find four Answ The an e	f (43) fula: 20 35 by Ta decima wer any mean a xamina distribu	from the 25 state of the 25 st	series from of the findard re respind the	owing 0 91 method $\frac{dy}{dx} = 0$ follow deviate expective expective expective	data us 35 260 od, the $= x^2y - 1$ ing: tion of the selly 34.4 oximates	40 231 values 1 with the main and anumbers	45 20 3 of y th y(0) arks of 16.5. A per of	is backy $at x = 0$ $at x = 0$ Assuming	0.1 and $x =$	e 0.2 to	4	3	2	1,2,12
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b)	Find form x f(x) Find four Ans: The an e the c mark	f (43) fula: 20 35 by Ta decima wer any mean a examina distribu ks (i) b ine (i)	from the fro	series es from of the findard re respind then 30 ar hypor	owing 0 91 method $\frac{dy}{dx} = 0$ follow deviate expective expecti	data us 35 260 od, the $= x^2y - 1$ ing: tion of the self oximate (ii) less	40 231 values 1 with the material and than 4	45 20 3 of y th y(0) arks ob 16.5. A ber of	is backy $at x = 0$ $at x = 0$ otained landstudents	0.1 and $x =$ by 1000 studies the norm	dents in ality of o obtain	4	3	3	1,2,12
b)	Find form X f(x) Find four Answ The an e the c mark Definition of the company Obt Obt Find Obt Find	f (43) f ula: 20 35 by Ta decimal wer any mean a examina distribut ks (i) b ine (i) difficance	from the fro	series es from the findard re respind the find 30 are hyportically from the find the	owing 0 91 method $\frac{dy}{dx} = 0$ follow deviate expective approad 60 (thesis,	data us 35 260 od, the $= x^2y - $	40 231 values 1 with the main and than 4 Alternatits.	45 20 arks ob 16.5. Aborr of 45.	is backy at $x = \frac{1}{2}$ otained in the students of the st	0.1 and $x =$ by 1000 studies the norms expected to	dents in ality of o obtain	4	3	2	1,2,12
b) a)	Find form X f(x) Find four Answ The an e the c mark Definition of the company Obt Obt Find Obt Find	f (43) fula: 20 35 by Ta decima wer any mean a xamina distribu ks (i) b ine (i) iificanc ain the owing (from the fro	series es from the findard re respind the find 30 are hyportically from the find the	owing $ \begin{array}{c} 0 \\ 91 \end{array} $ method $ \frac{dy}{dx} = \\ \text{follow} $ deviate dective approad 60 (thesis, possible stapped approach so approach s	data us 35 260 od, the $= x^2y - $	40 231 values 1 with the main and than 4 Alternatits.	arks ob 16.5. Apper of 45. Antive	is backy at $x = \frac{1}{2}$ otained in the students of the st	0.1 and $x =$ by 1000 studies the norm expected to sis, (iii) L	dents in ality of o obtain	4 4	3	3	1,2,12 1,2,12 1,2,12

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

i)	Blooms Taxonomy Level – 1	20%
i)	Blooms Taxonomy Level – 2	30%