Module 5 - Elementary Numerical Methods

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Q.NO	Question													
1.	a) From the following table estimate the number of students who have obtained the marks in													
	between 40 and 45 using Forward Interpolation formula													
	Marks	Marks 30-40 40-50 5		0-60 60-		60-7	70 70-80		-80					
	No. of	f studen	ts 3	1	42	5	51		35		31			
	b) Using Forward interpo			erpola	ation and Backward interpolation for							ion fo	rmu	ala find the value of $f(1)$ and
	f(10).													
		X		4	5	6		7		8		9		
		f(x)	4.8	8.4	14.5	23	.0	36.	2 :	52.8	5	73.9		
2.	a) The area of a circle (A) corresponding to the diameter (D) is given below; Find the area													
	corresp	onding	to diar	neter	105 u	sing	an ar	pro	opria	te in	nter	polat	ion :	formula.
		D 8	0 8	85	90	9:	5	10	0					
		A 5	026	5674	6362	2 70	880	78	54					
				-					f(42) an	nd f	(85) ı	ısin	g forward interpolation and
	backwa	ard inter	polatio	on for	mula	respe	ective	ely						
		X	40	50		60		70		80		90		
		f(x)	184	20	4	226		250)	276	5	304		
3.	a) The population of a town is given by the table													
	_	Years		195		196		197		198	81	199	91	
]	Populati	ion in	19.	96	39.6	5	58.	81	77.	.21	94.	.61	
		housan												
	Using Newton's forward interpolation and backward interpolation formula. Calculate the incr in the population from the year 1955 to 1985. b) Find f(3.5) by using Newton's backward interpolation formula. Given that f(0) = 7.4720,							n formula. Calculate the increase						
								Given that $f(0) = 7.4720$,						
		7.5854,												
4.	a) Construct interpolating polynomial for the data given below by using Newton-Divided							using Newton-Divided						
	differei	nce forn		Τ,	1-					1.0	_			
		X	2	4	5	6		8		10				
	1 \ 7.7	f(x)	10	96	196		350	86		174				
	b) Use Newton's-divided difference formula to find f(9), given data						ta							
		X	5	7	1		13		17	20				
		f(x)	150	392		452	236		520					
5.						$= \frac{1}{5}$	f(2)) =	9 and	f(5)	5)=	1335	5 the	en find f(3) by using Newton's-
	divided Difference formula. b) Using Newton's divided difference formula find f(8), f(15) from the following table.							and the fellowing tel-1						
								om the following table.						
		X	4	5	7	10	11		13	20				
		f(x)	48	100	294	900	12	210	202	28				

 a) Using Newton's divided difference formula find f(4) from the following table. x 0 2 3 6 f(x) -4 2 14 158 b) If y(1) = 3, y(3) = 9, y(4) = 30, y(6) = 132 find the interpolation polynomial using Lagrange's Interpolation formula 7. a) Using Lagrange's formula, find the interpolating polynomial that approximate the function described by the following table. Hence find f (3). x 0 1 2 5 f(x) 2 3 12 147 b) Using Lagrange's Interpolation formula, find the value of y when x = 2 from the following data x 1 3 4 6 y 4 40 85 259 a) The following are the measurement T made on a curve recorded by oscilograph representing a change of current I due to a change in the conditions of an electric current. T 1.2 2 2.5 3 1 1.36 0.58 0.34 0.20 Using Lagrange's formula, find 1 at T = 1.6. b) Using Lagrange's formula find the interpolating polynomial and find 'y' when x = 4 from the data given below x 0 2 3 5 y 2 10 17 37 9. a) Using Newton - Raphson method, find a real root of x sinx + cosx = 0 nearer to x = π , (Here x is in radians) b) Using Newton - Raphson method, find a real root of the equation xe^x = 2 correct to four decimal places. b) Find the approximate value of the real root of the equation tanx = x by Newton - Raphson method by taking x = 4.5 b) Find the real root of the equation xosx = 3x - 1 that lies between 0.5 & 1.0 (Here x is in radians) correct to four place of decimals b) Using Regula-Falsi method, find the root of the equation xosx = 3x - 1 that lies between 0.4 & 0.6, carry out four approximation. 		
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3, carry out four approximation.	13.	•
		3, carry out four approximation.

	b) Using Regula–Falsi method, find the root of the equation $x log_{10}x - 1.2 = 0$, correct to four place of decimal									
14.	a) Using Regula–Falsi method, find the root of the equation $x^3 - 4x - 9 = 0$									
17.	b) Find the approximate value of the real root of the equation $x^3 - 3x + 4 = 0$ using the method									
	of Regula-Falsi.(carryout three iterations)									
15.										
13.	a) Evaluate $\int_0^5 \frac{dx}{4x+5}$ using Simpson's $1/3^{\rm rd}$ rule. by using 10 equal parts. Hence find $\log_e 5$.									
	b) By using Simpson's $1/3^{\text{rd}}$ rule, evaluate $\int_0^{0.6} e^{-x^2} dx$ taking 7 ordinates									
16.	a) By using Simpson's $1/3^{rd}$ rule, evaluate $\int_{1}^{5} f(x)dx$ given									
	X 1 2 3 4 5									
	f(x) 13 50 70 80 100									
	b) The Velocity 'v' (km\min) of a moped which starts from rests, is given at fixed intervals of									
	time 't'(min) as follows:									
	T 2 4 6 8 10 12 14 16 18 20									
	V 10 18 25 29 32 20 11 5 2 0									
	Estimate approximately the distance covered in 20 minutes using Simpson's 1/3 rd rule.									
17.	a) Use Simpson's $3/8^{th}$ rule to compute the area bounded by the curve $y = f(x)$, x-axis and									
	extreme ordinates from the following table.									
	X 0 1 2 3 4 5 6									
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									
	b) Evaluate $\int_{4}^{5.2} log_e x dx$ using Simpson's $3/8^{th}$ rule by taking 7 ordinates.									
18.	a) Evaluate $\int_0^{\frac{\pi}{2}} e^{\sin x} dx$ by Simpson's $3/8^{th}$ rule and Weddle's rule by taking 7 ordinates									
	b) Evaluate $\int_0^1 \frac{1}{1+x} dx$ dividing the interval into six equal parts by applying									
	Simpson's 3/8 th rule and deduce an approximate value of log _e 2.									
19.	a) Evaluate $\int_0^{1.2} e^x dx$ using Weddle's rule. Taking six equal sub intervals compare the results									
	with exact value.									
	b) Using Weddle's rule, estimate the area bounded by the curve the x-axis and the line $x=1 \& x=4$									
	X 1 1.5 2 2.5 3 3.5 4									
	f(x) 2 2.4 2.7 2.8 3 2.6 2.1									
20.	a) Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ using Weddle's rule. By using 6 equal parts. Hence find $\log_e 2$.									
	b) Evaluate $\int_0^6 3x^2 dx$ dividing the interval into six equal parts by applying (i) Simpson's $1/3^{rd}$									
	rule (ii) Simpson's $3/8^{th}$ rule (iii) Weddle's rule and verify with exact integral.									
	1 () 1 ()									