Approved by AICTE, New Delhi, Accredited By NAAC, Bengaluru And NBA, New Delhi

DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	TEST-I	Maximum marks: 50
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle	Time: 9:30AM-11:00AM
	Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Date: 10-07-2023

Sl. No.	Questions	M	ВТ	СО
1	Details regarding marks scored by 280 candidates in an examination are given by the following table. Using Newton- Gregory interpolation formula estimate the number of candidates who secured marks between 45 and 65. Marks: Below 30 30-40 40-50 50-60 60-70 70-80 Number of Students: 35 49 62 74 40 20	10	L2	2
2. (a)	The following table gives the relation between steam pressure and temperature. T°C 361 367 378 387 399 P 154.9 167.9 191 212.5 244.2 Using suitable interpolation formula find the pressure at the temperature 372°C.	6	L2	3
2. (b)	Given the following table of values of x and y , find using inverse interpolation the value of x when $y = 100$. $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	4	L2	3
3. (a)	The following table gives corresponding values of pressure p and specific volume v of superheated steam: v 2 4 6 8 10 p 105 42.7 25.3 16.7 13 Find the rate of change of p with respect to v at $v = 4$ and $v = 8$.	6	L2	1
3. (b)	Solve $\frac{d^3x}{dt^3} - 8\frac{d^2x}{dt^2} + 5\frac{dx}{dt} + 50x = 0.$	4	L1	1
4	Obtain the general solution of the differential equation: $2\frac{d^2y}{dx^2} + \frac{dy}{dx} - y = e^{\frac{x}{2}} + \sin^2(2x) + x^2.$	10	L3	2
5. (a)	Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 13y = e^{2x}\sin(3x)$.	5	L3	2
5. (b)	Solve the initial value problem $\frac{d^2x}{dt^2} + \mu x = 0 \ (\mu > 0)$ given that $x = a$ and $\frac{dx}{dt} = 0$ when $t = \frac{\pi}{\sqrt{\mu}}$.	5	L2	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

		D 1	-Dioonis	laxonomy	, co-cour	se Outcom	cs, 1v1-1v1ai	K.S			
	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks											
Distribution	Max Marks	10	25	15	00	04	31	15			

Approved by AICTE, New Delhi, Accredited By NAAC, Bengaluru And NBA, New Delhi

DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	СІЕ-ІІ	Maximum marks: 50
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Time: 10:00AM-11:30AM Date: 21-08-2023

Sl. No.	Questions	M	ВТ	СО
1	Using the method of variation of parameters, solve the differential equation			_
	$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \tan(x).$	10	L3	3
2	Reduce the differential equation $x \frac{d^2y}{dx^2} + 5 \frac{dy}{dx} + 4 \frac{y}{x} = \log_e(x)$, where $x > 0$, to a	10	L3	3
	linear differential equation with constant coefficients and hence solve.	10	L3	3
3. (a)	The current in an LRC circuit is governed by the differential equation			
	$L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = E(t)$. A circuit in series has an electromotive force given by			
	$E(t) = 0V$, a resistor of 10Ω , an inductor of $0.25H$ and a capacitor of $0.001F$. If the	6	L2	2
	initial current and the initial charge on the capacitor are both zero, determine the			
	charge on the capacitor at any time $t > 0$.			
3. (b)	Find all the solutions of the linear congruence $6x \equiv 15 \pmod{21}$.	4	L2	2
4. (a)	By using the Euclidean algorithm, determine the greatest common divisor d of 2947	7	T 1	1
	and 3997 and find integers x and y to satisfy $2947x + 3997y = d$.	/	L1	1
4. (b)	Compute the last two digits of the number 87 ⁴⁷⁴ .	3	L2	2
5	Given the public key $(e, n) = (11,65)$, encrypt plain text J B E, where the alphabets			
	$A, B, C, \dots X, Y, Z$ are assigned the numbers 2,3,, 26,27. Give the cipher text. Find	10	L3	4
	the private key d .			

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

			Dioonis .	i anomomy	, co cour.	oc outcom	100, 111 1114	ILD			
	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks											
Distribution	Max Marks	7	13	20	10	7	13	30			

Approved by AICTE, New Delhi, Accredited By NAAC, Bengaluru And NBA, New Delhi

DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	IMPROVEMENT CIE	Maximum marks: 50
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Time: 02:00PM-3:30PM Date: 06-09-2023

Sl. No.	Questions	M	BT	СО
1. (a)	A particle moves along the curve $x = t^3 + 1$, $y = t^2$, $z = 2t + 3$, where t is the time. Find the components of its velocity and acceleration at $t = 1$ in the direction $\hat{i} + \hat{j} + 3\hat{k}$.	5	L1	1
1. (b)	If $\vec{f} = \nabla(2x^3y^2z^4)$, then find $div(\vec{f})$ at $(1,2,-1)$.	5	L2	2
2. (a)	Find the values of the constants a, b, c so that the directional derivative of $\phi = axy^2 + byz + cz^2x^3$ at $(1,2,-1)$ has maximum of magnitude 64 in a direction parallel to the z-axis.	6	L3	3
2. (b)	If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ and $r = \vec{r} $, then show that $\nabla r^n = nr^{n-2}\vec{r}$.	4	L3	3
3	Find the values of the constants a, b, c such that $\vec{F} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is conservative. Also find its scalar potential.	10	L3	4
4	The following table gives the temperature θ of a cooling body at different instant of time t (in seconds)	10	L2	2
5. (a)	Using suitable interpolation formula find $y(11)$ for the following data $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6	L2	3
5. (b)	Given the following table of values of x and y , find by using inverse interpolation the value of x when $y = 100$. $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	4	L2	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

			DIOUTIO .	i and in one	,	30 O G100 0111	00, 111 11141	110			
	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks											
Distribution	Max Marks	5	15	20	10	05	25	20			



DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	TEST-II	Maximum marks: 50
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Time: 10:00AM-11:30AM Date: 21-08-2023

Scheme and Solutions

Q.No	PART -B	Marks						
1.	The auxiliary equation is $m^2 - 2m + 2 = 0$ and roots are $m = 1 \pm i$	1						
	$CF = e^x(c_1\cos(x) + c_2\sin(x))$ and $PI = Au + Bv$	1						
	$W = \begin{vmatrix} e^x \cos(x) & e^x \sin(x) \\ e^x (-\sin(x) + \cos(x)) & e^x (\sin(x) + \cos(x)) \end{vmatrix} = e^{2x}$	2						
	$A = -\int \frac{vf(x)}{W} dx = -\int \frac{e^x \sin(x) e^x \tan(x)}{e^{2x}} dx$							
	$A = -\int \frac{\sin^2(x)}{\cos(x)} dx = -[\log_e(\sec(x)) + \tan(x)) - \sin(x)]$	3						
	$B = \int \frac{uf(x)}{W} dx = \int \frac{e^x \cos(x) e^x \tan(x)}{e^{2x}} dx = \int \sin(x) dx = -\cos(x)$	2						
	$y = e^{x}(c_1 \cos(x) + c_2 \sin(x)) - e^{x} \cos(x) \log_e(\sec(x) + \tan(x))$	1						
2.	Given equation is converted to linear differential equation with constant coefficients by substituting $x = e^z$ or $z = \log_e(x)$ and $xD = D_1$, $x^2D^2 = D_1(D_1 - 1)$ where $D_1 = \frac{d}{dz}$	2						
	$(D_1^2 + 4D_1 + 4)y = ze^z$							
	The auxiliary equation is $m^2 + 4m + 4 = 0$ and roots are $m = -2, -2$							
	$CF = \frac{(c_1 + c_2 \log_e(x))}{x^2}$	2						
	$PI = \frac{1}{D_1^2 + 4D_1 + 4}e^z z = e^z \frac{1}{D_1^2 + 6D_1 + 9}z = \frac{e^z}{9} \left(1 + \frac{D_1}{3}\right)^{-2} z = \frac{e^z}{9} \left(z - \frac{2}{3}\right)$	1+3+1						
	$PI = \frac{x}{9} \left(\log_e(x) - \frac{2}{3} \right)$							
	y = CF + PI	1						
3(a)	q'' + 40q' + 4000q = 0 Auxiliary equation $m^2 + 40m + 4000 = 0$	1						
	Roots: $m = -20 \pm 60i$	1						
	$q = e^{-20t}(c_1\cos(60t) + c_2\sin(60t)$	1 1+1						
	$ \begin{vmatrix} c_1 = 0, c_2 = 0 \\ q(t) = 0 \end{vmatrix} $	1						

3(b)	21k + 15	
3(0)	$21 6x - 5 \Rightarrow 6x - 15 = 21k \Rightarrow x = \frac{21k + 15}{6}$	1
	$x = 6 \pmod{21}, \qquad x = 13 \pmod{21}, \qquad x = 20 \pmod{21}$	3
	$3997 = 1 \times 2947 + 1050$	
4(a)	$2947 = 2 \times 1050 + 847$	
	$1050 = 1 \times 847 + 203$	
	$847 = 4 \times 203 + 35$	
	$203 = 5 \times 35 + 28$	
	$35 = 1 \times 28 + 7$	
	$28 = 4 \times 7 + 0$	
	gcd(2947,3997) = 7	4
	Linear combination:	
	$7 = 1 \times 35 - 1 \times 28$	
	$7 = 1 \times 35 - 1 \times (203 - 5 \times 35)$	
	$7 = -1 \times 203 + 6 \times 35$	
	$7 = -1 \times 203 + 6 \times (847 - 4 \times 203)$	
	$7 = 6 \times 847 - 25 \times 203$	
	$7 = 6 \times 847 - 25 \times (1050 - 1 \times 847)$	
	$7 = -25 \times 1050 + 31 \times 847$	
	$7 = -25 \times 1050 + 31 \times (2947 - 2 \times 1050)$	
	$7 = 31 \times 2947 - 87 \times 1050$	
	$7 = 31 \times 2947 - 87 \times (3997 - 1 \times 2947)$	
	$7 = -87 \times 3997 + 118 \times 2947$	
	$7 = -87 \times 3997 + 118 \times (2947 + 0 \times 3997)$	
	$7 = 118 \times 2947 - 87 \times 3997$	3
	7 = 2947(118) + 3997(-87)	3
	x = 118, y = -87	
4(b)	gcd(87,100) = 1	
	By Euler's theorem, $87^{\phi(100)} \equiv 1 \; (mod \; 100) \Rightarrow 87^{40} \equiv 1 \; (mod \; 100)$	1
	$87^{440} \equiv 1 \ (mod100)$	1
	$87^3 \equiv 3 \ (mod100)$	
	$87^{33} \equiv 47 \pmod{100}$	2
	$87^{474} \equiv 1 \times 47 \times 87 \ (mod\ 100)$	
	$87^{474} \equiv 89 \ (mod \ 100)$	
5	e = 11, $n = 65$, $p = 5$, $q = 13$	1
	$\phi(65) = 48$	1
	$c_J = 11^{11} (mod \ 65) = 6$	2
	$C_B = 3^{11} \pmod{65} = 22$	2
	$C_E = 6^{11} (mod \ 65) = 11$	2
	$de \equiv 1 \pmod{48}$	2
	d = 35	

DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	TEST-I	Maximum marks: 50
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Time: 9:30AM-11:00AM Date: 10-07-2023

Scheme and Solutions

1.								PART -B	Marks
	Cum	ulativ	e frec	quency	table				
		ks les				0 40		60 70 80	1
				dents ($(y) \mid 3$	5 84	146	220 260 280	1
	Diffe	rence	table	_				1	
	x	y	Δy	$\Delta^2 y$	$\Delta^3 y$	$\Delta^4 y$	$\Delta^5 y$		
	30	35	40						
	40	84	49	13					
	40	04	62	13	-1				
	50	146	02	12	-1	-45			3
	50	110	74	12	-46		105		
	60	220		-34		60			
			40		14				
	70	260		-20					
			20						
	80	$\frac{280}{x-x}$	45-	30		<u> </u>		65_80	
	$p = \frac{1}{2}$	$\frac{\lambda - \lambda_0}{h} =$	$=\frac{43-1}{10}$	$\frac{30}{1} = 1$.5 and	$p = \frac{\lambda}{2}$	$\frac{1-x_n}{h} =$	$\frac{65-80}{10} = -1.5$	1
	Using Newton's forward interpolation formula, we get								
	Usin	g New	/ton's	s torwa	ard int	erpola	tion to	rmula, we get 1)(n 2)	
	y = 1	$y_0 + \mu$	$o\Delta y_0$	$+\frac{p(p)}{p}$	<u>) 1)</u> 21	$\Delta^2 y_0$ -	$+\frac{p(p)}{p}$	$\frac{-1)(p-2)}{3!}\Delta^3y_0+\cdots$	
				5 ≈ 11	4 :			5:	2
		-				nterpo	lation	formula, we get	
								$\frac{(p+1)(p+2)}{3!}\nabla^3y_n+\cdots$	
					4 :	$v y_n$		$y_n + \cdots$	2
	, ·	•		117 ≈		1	1 .	45 165 246 444 425	
	The							een 45 and 65 is $246 - 111 = 135$.	1
2(a)	v = -		•			, ,		$\frac{(x-399)}{(37)(3(1-300))}$ 154.9	
	<i>y</i> —	(361	- 36	7)(36	1 - 37	78)(36	51 - 3	8/)(301 – 399)	
			_	<u> </u>	(x -	361)(x-3	$\frac{78)(x-387)(x-399)}{78)(367-387)(367-399)}167.9 +$	2
		(2(1)	(367	7 - 36	1)(36	7 - 3'	78)(367 – 387)(367 – 399)	
	(0.70	$\frac{(x-}{x}$	301)	$\frac{1}{\sqrt{x}}$	367)(2	x - 38	$\frac{37)(x}{207}$	- 399) (370 - 300) 191	
	(378	- 36	1)(3	78 – 3	367)(. - (v =	378 – 3611 <i>(</i>	387)(2 – 30	$\frac{378 - 399}{(378 - 399)}$ 191	
			+	+ (205	7 26	1)(20	7 2	$\frac{(67)(x-378)(x-399)}{(67)(387-378)(387-399)}$ 212.5	
				(38/	- 36 (x –	1)(38 361)(x - 30	57)(x – 378)(x – 387) 67)(x – 378)(x – 387)	
			+	(300) _ 26	1)(20	9 - 3	$\frac{(67)(x-378)(x-387)}{(67)(399-378)(399-387)}244.2$	
	4.(44)	_ ($9744x^2 + 4568.21x - 435168 = 178.1827$	4

2(b)	(y-24)(y-54)(y-129) $(y-10)(y-54)(y-129)$							
	$x = \frac{(y-24)(y-54)(y-129)}{(10-24)(10-54)(10-129)} + \frac{(y-10)(y-54)(y-129)}{(24-10)(24-54)(24-129)}3$	2						
	$+\frac{(y-10)(y-24)(y-129)}{(54-10)(54-24)(54-129)}5+\frac{(y-10)(y-24)(y-54)}{(129-10)(129-24)(129-54)}8$							
	(34 - 10)(34 - 24)(34 - 129) $(129 - 10)(129 - 24)(129 - 34)$							
	When $y = 100, x = 5.9199$	2						
3(a)	Difference table							
	$oxed{v} oxed{p} oxed{\Delta p} oxed{\Delta^2 p} oxed{\Delta^3 p} oxed{\Delta^4 p}$							
	2 105							
	-62.3							
	4 42.7 44.9	2						
	-17.4 -36.1							
	-8.6 -3.9							
	8 16.7 4.9							
	-3.7							
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							
	$\left(\frac{dp}{dv}\right)_{v=4} = \frac{1}{h} \left[\Delta p_0 - \frac{1}{2} \Delta^2 p_0 + \frac{1}{3} \Delta^3 p_0 - \frac{1}{4} \Delta^4 p_0 + \cdots \right] = \frac{1}{2} \left[-17.4 - \frac{8.8}{2} - \frac{3.9}{3} \right] = -11.55$	2						
	$\left(\frac{dp}{dv}\right)_{v=0} = \frac{1}{h} \left[\nabla p_n + \frac{1}{2} \nabla^2 p_n + \frac{1}{3} \nabla^3 p_n + \frac{1}{4} \nabla^4 p_n + \cdots \right] = \frac{1}{2} \left[-8.6 + \frac{8.8}{2} - \frac{36.1}{3} \right] = -8.11$	2						
	$\langle av \rangle_{v=8} h \mid v \mid z \mid v \mid 3 \mid v \mid 4 \mid v \mid 1 \mid z \mid 1 \mid z \mid 2 \mid 3 \mid 1$							
	Auxiliary equations $m^3 - 8m^2 + 5m + 50 = 0$	1						
3(b)	Roots $m = -2, 5, 5$	$\begin{bmatrix} 1 \\ 2 \end{bmatrix}$						
	$x = c_1 e^{-2t} + (c_2 + c_3 t) e^{5t}$							
4	Auxiliary equations $2m^2 + m - 1 = 0$, Roots $m = \frac{1}{2}, -1$	1 1						
	$C.F = c_1 e^{x/2} + c_2 e^{-x}$							
	$PI = \frac{xe^{x/2}}{3} - \frac{1}{2} + \frac{33\cos(4x) - 4\sin(4x)}{2210} - (x^2 + 2x + 6)$	2+3+2						
	y = CF + PI 2210 $(x + 2x + 5)$	1						
5(a)	Auxiliary equations $m^2 - 4m + 13 = 0$, Roots $m = 2 \pm 3i$	1						
	$C.F = e^{2x}(c_1\cos(3x) + c_2\sin(3x))$	1						
	$PI = \frac{1}{D^2 - 4D + 13}e^{2x}\sin(3x) = e^{2x}\frac{1}{D^2 + 9}\sin(3x) = -\frac{xe^{2x}\cos(3x)}{6}$	2						
	$y = CF + PI = e^{2x}(c_1 \cos(3x) + c_2 \sin(3x)) - \frac{xe^{2x} \cos(3x)}{6}$	1						
5(b)	Auxiliary equations $m^2 + \mu = 0$, Roots $m = \pm \sqrt{\mu}i$	1						
	$x = c_1 \cos(\sqrt{\mu}t) + c_2 \sin(\sqrt{\mu}t)$	1						
	$x' = -c_1 \sqrt{\mu} \sin(\sqrt{\mu}t) + c_2 \sqrt{\mu} \cos(\sqrt{\mu}t)$							
	$c_1 = -a \text{ and } c_2 = 0$							
	$x = -a\cos(\sqrt{\mu}t)$	1						

Approved by AICTE, New Delhi, Accredited By NAAC, Bengaluru And NBA, New Delhi

DEPARTMENT OF MATHEMATICS

Course: NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS	IMPROVEMENT CIE	Maximum marks: 50
Course code: 22MA21C	Second semester 2022-2023 Physics Cycle Branch: AI, BT, CD, CS, CY, IS, SPARK-C	Time: 02:00PM-3:30PM Date: 06-09-2023

Sl. No.	Questions	Marks
1. (a)	$\frac{d\vec{r}}{dt} = 3t^2\hat{\imath} + 2t\hat{\jmath} + 2\hat{k} \Rightarrow \left(\frac{d\vec{r}}{dt}\right)_{t=1} = 3\hat{\imath} + 2\hat{\jmath} + 2\hat{k}$	2
	$\frac{d^2\vec{r}}{dt^2} = 6t\hat{\imath} + 2t\hat{\jmath} + 0\hat{k} \Rightarrow \left(\frac{d^2\vec{r}}{dt^2}\right)_{t=1} = 6\hat{\imath} + 2\hat{\jmath}$	1
	Component of velocity = $\frac{11}{\sqrt{11}}$	1
	Component of acceleration = $\frac{8}{\sqrt{11}}$	1
1. (b)		2
	$div(\vec{f}) = 12xy^2z^4 + 4x^3z^4 + 24x^3y^2z^2$	2
	$div(\vec{f})_{(1,2,-1)} = 48 + 4 + 96 = 148$	1
2. (a)	$\nabla \phi = (ay^2 + 3cz^2x^2)\hat{i} + (2axy + bz)\hat{j} + (by + 2czx^3)\hat{k}$	2
	$\nabla \phi_{(1,2,-1)} = (4a+3c)\hat{i} + (4a-b)\hat{j} + (2b-2c)\hat{k}$	1
	Directional derivative of ϕ at $(1,2,-1)$ in the direction parallel to z axis is given by	
	$\nabla \phi . \hat{k} = 64$	
	$\Rightarrow 2b - 2c = 64 \text{ and } 4a + 3c = 0, 4a - b = 0$	
	Solving $a = 6$, $b = 24$, $c = -8$.	1+1+1
2. (b)	$r^2 = x^2 + y^2 + z^2$ and $\frac{\partial r}{\partial x} = \frac{x}{r}$, $\frac{\partial r}{\partial y} = \frac{y}{r}$, $\frac{\partial r}{\partial z} = \frac{z}{r}$	1
	$\nabla r^{n} = nr^{n-1} \frac{x}{r} \hat{i} + nr^{n-1} \frac{y}{r} \hat{j} + nr^{n-1} \frac{z}{r} \hat{k} = nr^{n-2} \vec{r}$	1+2
3	$curl \vec{F} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ x + 2y + az & bx - 3y - z & 4x + cy + 2z \end{vmatrix} = (c+1)\hat{\imath} - (4-a)\hat{\jmath} + (b-2)\hat{k} = \vec{0}$	1
	a=4 , $b=2$ and $c=-1$	3
	$\vec{F} = (x + 2y + 4z)\hat{i} + (2x - 3y - z)\hat{j} + (4x - y + 2z)\hat{k}$	
	$\frac{\partial \phi}{\partial x} = x + 2y + 4z, \ \frac{\partial \phi}{\partial y} = 2x - 3y - z, \ \frac{\partial \phi}{\partial z} = 4x - y + 2z$	1

Approved by AICTE, New Delhi, Accredited By NAAC, Bengaluru And NBA, New Delhi

	$d\phi = \frac{\partial \phi}{\partial x}dx + \frac{\partial \phi}{\partial y}dy + \frac{\partial \phi}{\partial z}dz$	_					
	$u\varphi = \frac{\partial x}{\partial x} ux + \frac{\partial y}{\partial y} uy + \frac{\partial z}{\partial z} uz$	1					
	$d\phi = d\left(\frac{x^2}{2}\right) + d(2xy) + d(4xz) - d\left(\frac{3}{2}y^2\right) - d(yz) + d(z^2)$	3					
	$\phi = \frac{x^2}{2} + 2xy + 4xz - \frac{3}{2}y^2 - yz + z^2 + c$	1					
4	Difference table						
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
	-10.8						
	3 74.5 3.3						
	-7.5 -2.3	3					
	5 67 1 1.6						
	7 60.5 -0.7 0.3						
	-6.2						
	9 54.3						
	$p = \frac{t - t_0}{h} = \frac{2 - 1}{2} = 0.5$ and $p = \frac{t - t_n}{h} = \frac{8 - 9}{2} = -0.5$	1					
	Using Newton's forward interpolation formula, we get						
	$y = \theta_0 + p\Delta\theta_0 + \frac{p(p-1)}{2!}\Delta^2\theta_0 + \frac{p(p-1)(p-2)}{2!}\Delta^3\theta_0 + \cdots$						
	$\theta(2) = 79.28125$	2					
	$\theta(2) = 79.28125$ Using Newton's backward interpolation formula, we get						
	$y = \theta_n + p\nabla\theta_n + \frac{p(p+1)}{2!}\nabla^2\theta_n + \frac{p(p+1)(p+2)}{2!}\nabla^3\theta_n + \cdots$						
	2! 3!						
	$\theta(8) = 57.34375$						
	$\frac{d\theta}{dt} = \frac{1}{h} \left[\nabla \theta_n + \frac{1}{2} \nabla^2 \theta_n + \frac{1}{3} \nabla^3 \theta_n + \frac{1}{4} \nabla^4 \theta_n + \dots \right] = \frac{1}{2} \left[-6.2 + \frac{0.3}{2} - \frac{0.7}{3} + \frac{1.6}{4} \right] = -2.9416$ $= \frac{(x - 7)(x - 10)(x - 12)(x - 15)}{(6 - 7)(6 - 10)(6 - 12)(6 - 15)} 3 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(7 - 10)(7 - 12)(7 - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(7 - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)(x - 15)} 10 + \frac{(x - 6)(x - 10)(x - 12)(x - 15)}{(x - 6)(x - 10)(x - 12)($	2					
5. (a)	$=\frac{(x-7)(x-10)(x-12)(x-15)}{3+\frac{(x-6)(x-10)(x-12)(x-15)}{10+1}}$						
	(6-7)(6-10)(6-12)(6-15) $(7-6)(7-10)(7-12)(7-15)$	3					
	$\frac{(x-6)(x-7)(x-12)(x-15)}{(10-6)(10-7)(10-12)(10-15)}43 + \frac{(x-6)(x-7)(x-10)(x-15)}{(12-6)(12-7)(12-10)(12-15)}75$						
	(x-6)(x-7)(x-12)(x-12)						
	$+\frac{(x-6)(x-7)(x-10)(x-12)}{(15-6)(15-7)(15-10)(15-12)}138$	2					
	$y(x) = x^2 - 6x + 3$						
F (1)	y(11) = 58	1					
5. (b)	$x = \frac{(y - 24)(y - 54)(y - 129)}{(10 - 24)(10 - 54)(10 - 129)} + \frac{(y - 10)(y - 54)(y - 129)}{(24 - 10)(24 - 54)(24 - 129)}3$						
	$y(1) = 58$ $x = \frac{(y - 24)(y - 54)(y - 129)}{(10 - 24)(10 - 54)(10 - 129)} + \frac{(y - 10)(y - 54)(y - 129)}{(24 - 10)(24 - 54)(24 - 129)}3 + \frac{(y - 10)(y - 24)(y - 129)}{(54 - 10)(54 - 24)(54 - 129)}5 + \frac{(y - 10)(y - 24)(y - 54)}{(129 - 10)(129 - 24)(129 - 54)}8$	2					
	When $y = 100$, $x = 5.9199$	2					

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution Affiliated to VTU) H Semester B. E. Examinations Oct-2023

(Common to AI, BT, CS, CY, CD & IS)

NUMBER THEORY, VECTOR CALCULUS AND COMPUTATIONAL METHODS Maximum Marks: 100 Time: 03 Hours

Instructions to candidates:

- 1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
- 2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.
- 3. Formula book to be provided.

PART-A

		PART-A		
1	1.1	General solution of $4x \equiv 7 \mod 5$ is	01	
	1.2	The number of integers less than 181 that are relatively prime to 181 is		
		·	01	
	1.3	If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$, $ \vec{r} = r$, then $\nabla r = \underline{\hspace{1cm}}$.	01	
	1.4	If $\vec{F}(t)$ has a constant magnitude then $\vec{F}(t) \cdot \frac{d\vec{F}(t)}{dt}$ is	01	
	1.5	If \vec{F} represent the velocity of fluid, the $\oint_C \vec{F} \cdot d\vec{r}$ represents	01	
	1.6	If R is the projection of surface in XY –plane, then $ds = $	01	
	1.7	Particular integral of $\frac{d^2x}{dt^2} + \frac{6}{7}(x - \sqrt{2}) = 0$ is	01	
	1.8	If the roots of the auxiliary equation are $\pm i$ and 2 then the corresponding		
		differential equation is	01	
	1.9	The 3^{rd} order difference of 3^{rd} degree polynomial is	01	
	1.10	The value of $\Delta^3[(1-x)(1-3x)(1-5x)]$ taking the interval of differencing		
		h = 1 is	01	
	1.11	The sum of all positive divisors of 8620 is	02	
	1.12	The velocity and acceleration of a particle along a curve $x = t^2$, $y = 3t^2$,		
		$z = e^t$ at $t = 1$ is	02	
	1.13	If $\vec{F} = (x+y)\hat{\imath} + (2x-y)\hat{\jmath}$ evaluate $\int_c \vec{F} \cdot d\vec{r}$ along the straight line from		
		A(0,0) to $B(0,1)$.	02	
	1.14	If $y = e^{-t}$ is the solution of the equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + py = 0$, then the value		
		at at	02	
	1 1 7	of p is	02	
	1.15	Using suitable interpolation, fit a polynomial for the data.		
		x -1 2 4		
		y - 5 4 0	02	

PART-B

2	a	Find the greatest common divisor d of the number 4076 and 1024 using	
		Euclid's algorithm and then obtain the integers x and y to satisfy	06
		4076x + 1024y = d.	00
	b	Given the public key $(e,n) = (7,55)$, encrypt plain text MIT , where the	
		alphabets $\{A, B, C, \dots, X, Y, Z\}$ are assigned the numbers $\{5, 6, \dots, 29, 30\}$. Find	
		the cipher text and the private key d .	06
	С	Compute the remainder when 3 ²⁴⁷ is divided by 17.	04
3	a	Find the angle between the tangents to the curve	
		$x = (t - \frac{t^2}{2}), y = t^2 \text{ and } z = (t + \frac{t^2}{2}) \text{ at } t = \pm 1.$	08
	b	Prove that $div(r^n\vec{r}) = (n+3)r^n$. Hence show that \vec{r}/r^3 is solenoidal.	08

Show that an electromagnetic field				
scalar potential \$\phi\$ such that \$f = \(\psi_0 \). Also show that $duy = \(\psi_0 \) \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$			OR	
scalar potential \$\phi\$ such that \$f = \(\psi_0 \) Also show that $duy f = \nabla^2 \phi_0 \$. b find the directional derivative of \$\phi = xy^2 + y^2 \) at the point \$(1, -2, -1)\$ in the direction of the normal to the surface \$x \log_2 x - y^2 = -4\$ at \$(-1, 2, 1)\$. 5 a Using line integral, compute the work done by a force \$\psi = 3x^2! + (2xx - y)\frac{1}{2} + 2\psi \) the point \$(0, 0, 0)\$ to \$(2, 1, 3)\$ along the curve \$x = 2t^2\$, \$y = t\$, \$x = 4t^2\$ - \$t\$ from \$t = 0\$ to 1\$. Evaluate using divergence theorem: \$\int_0^2 = (x^2 - y^2) + (y^2 - xx) + (x^2 - xy) + (y^2 - xy) + (y	4	a	Show that an electromagnetic field	
b Find the directional derivative of $\phi = xy^2 + yy^2$ at the point $(1, -2, -1)$ in the direction of the normal to the surface $x \log_e x - y^2 = -4$ at $(-1, 2, 1)$. 5 a Using line integral, compute the work done by a force $\frac{1}{F} = 3x^2t^2 + (2xx - y)t^2 + zk$ when it moves a particle from the point $(0, 0, 0)$ to $(2, 1, 3)$ along the curve $x = 2t^2$, $y = t$, $z = 4t^2 - t$ from $t = 0$ to 1 . Evaluate using divergence theorem: If $\frac{1}{F} (x^2 - yx)t^2 + (y^2 - xx)t^2 + (z^2 - xy)k^2$, \hat{n} ds where S is the surface of the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$. OR 6 a Verify Green's theorem in the plane for $\oint ((x^2 + y)dx - xy^2dy)$ taken around the boundary of the rectangle whose vertices are $(0,0)$, $(a,0)$, (a,b) and $(0,b)$. b Evaluate by Stokes theorem $\oint_E ((x+y)dx+(2x-z)dy+(y+z)dz)$, C is the boundary of the triangular surface with vertices $(0,0,0)$, $(1,0,0)$ and $(1,1,0)$. 7 a Obtain the radial displacement x in a rotating disc at a distance $x \le x $			$\vec{f} = (e^x \cos y + yz)\hat{i} + (yz - a^x \sin y)\hat{i} + (zz + a^y \sin y)\hat{i} + $	
b Find the directional derivative of $\phi = xy^2 + yy^2$ at the point $(1, -2, -1)$ in the direction of the normal to the surface $x \log_e x - y^2 = -4$ at $(-1, 2, 1)$. 5 a Using line integral, compute the work done by a force $\frac{1}{F} = 3x^2t^2 + (2xx - y)t^2 + zk$ when it moves a particle from the point $(0, 0, 0)$ to $(2, 1, 3)$ along the curve $x = 2t^2$, $y = t$, $z = 4t^2 - t$ from $t = 0$ to 1 . Evaluate using divergence theorem: If $\frac{1}{F} (x^2 - yx)t^2 + (y^2 - xx)t^2 + (z^2 - xy)k^2$, \hat{n} ds where S is the surface of the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$. OR 6 a Verify Green's theorem in the plane for $\oint ((x^2 + y)dx - xy^2dy)$ taken around the boundary of the rectangle whose vertices are $(0,0)$, $(a,0)$, (a,b) and $(0,b)$. b Evaluate by Stokes theorem $\oint_E ((x+y)dx+(2x-z)dy+(y+z)dz)$, C is the boundary of the triangular surface with vertices $(0,0,0)$, $(1,0,0)$ and $(1,1,0)$. 7 a Obtain the radial displacement x in a rotating disc at a distance $x \le x $			scalar potential described that $f = \pi(x) + (xy + z)k$ is conservative and find the	
S a Using line integral, compute the work done by a force $\hat{F} = 3x^2l + (2xx - y)l + zk$ when it moves a particle from the point $(0,0,0)$ to $(2,1,3)$ along the curve $x = 2t^2$, $y = t$, $z = 4t^2 - t$ from $t = 0$ to 1. Evaluate using divergence theorem: If, $((x^2 - yz)l + (y^2 - xx)) + (z^2 - xy)k$, \hat{R} ds where S is the surface of the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$. OR 6 a Verify Green's theorem in the plane for $\oint \{(x^2 + y)dx - xy^2dy\}$ taken around the boundary of the rectangle whose vertices are $(0,0)$, $(a,0)$, (a,b) and $(0,b)$. Evaluate by Stokes theorem $\oint_{\mathcal{E}} ((x+y)dx + (2x-z)dy + (y+z)dz)$, C is the boundary of the triangular surface with vertices $(0,0,0)$, $(1,0,0)$ and $(1,1,0)$. 7 a Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2y}{dx^2} + \frac{dx}{dx} + \frac{dx}{z^2} = \frac{dx}{dx^2}$ using method of variation of parameters. OR 8 a Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ 9 a The following table gives the values of pressure P and specific volume V of saturated steam: V 40 50 60 70 80 Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2y}{dx^2} + \frac{dx}{dx} + \frac{dx}$		h		10
S a Using line integral, compute the work done by a force $\hat{F} = 3x^2l + (2xx - y)l + zk$ when it moves a particle from the point $(0,0,0)$ to $(2,1,3)$ along the curve $x = 2t^2$, $y = t$, $z = 4t^2 - t$ from $t = 0$ to 1. Evaluate using divergence theorem: If, $((x^2 - yz)l + (y^2 - xx)) + (z^2 - xy)k$, \hat{R} ds where S is the surface of the rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$. OR 6 a Verify Green's theorem in the plane for $\oint \{(x^2 + y)dx - xy^2dy\}$ taken around the boundary of the rectangle whose vertices are $(0,0)$, $(a,0)$, (a,b) and $(0,b)$. Evaluate by Stokes theorem $\oint_{\mathcal{E}} ((x+y)dx + (2x-z)dy + (y+z)dz)$, C is the boundary of the triangular surface with vertices $(0,0,0)$, $(1,0,0)$ and $(1,1,0)$. 7 a Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2y}{dx^2} + \frac{dx}{dx} + \frac{dx}{z^2} = \frac{dx}{dx^2}$ using method of variation of parameters. OR 8 a Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ 9 a The following table gives the values of pressure P and specific volume V of saturated steam: V 40 50 60 70 80 Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2y}{dx^2} + \frac{dx}{dx} + \frac{dx}$			the direction of the pormal to the surface at the point $(1,-2,-1)$ in	
$\vec{F} = 3x^2i + (2xz - y)j + zk \text{ when it moves a particle from the point } (0,0,0) \text{ to } (2,1,3) \text{ along the curve } x = 2t^2, y = t, z = 4t^2 - t \text{ from } t = 0 \text{ to } 1. \text{ Solute using divergence theorem:} $ $\iint_{\mathcal{E}} \left((x^2 - yz)i + (y^2 - xx)j + (z^2 - xy)k \right) . \hat{n} ds \text{ where } S \text{ is the surface of the rectangular parallelepiped } 0 \le x \le a, 0 \le y \le b, 0 \le z \le c. \text{ os } $			the anti-art of the surface $x \log_e z - y^2 = -4$ at $(-1, 2, 1)$.	06
$\vec{F} = 3x^2i + (2xz - y)j + zk \text{ when it moves a particle from the point } (0,0,0) \text{ to } (2,1,3) \text{ along the curve } x = 2t^2, y = t, z = 4t^2 - t \text{ from } t = 0 \text{ to } 1. \text{ Solute using divergence theorem:} $ $\exists k \text{ (} (x^2 - yz)i + (y^2 - xx)j + (z^2 - xy)k). \hat{n} \text{ ds where } S \text{ is the surface of the rectangular parallelepiped } 0 \le x \le a, 0 \le y \le b, 0 \le z \le c. $ OR $\exists \text{ Verify Green's theorem in the plane for } \oint \{(x^2 + y)dx - xy^2dy\} \text{ taken around the boundary of the rectangle whose vertices are } (0,0), (a,0), (a,b) \text{ and } (0,b). $ $\exists \text{ Evaluate by Stokes theorem } \oint ((x + y)dx + (2x - z)dy + (y + z)dz), C \text{ is the boundary of the triangular surface with vertices } (0,0,0), (1,0,0) \text{ and } (1,1,0). $ $\exists \text{ Obtain the radial displacement } x \text{ in a rotating disc at a distance } s \text{ from the axis, given by the differential equation } \frac{e^{x}x}{e^{x}} + \frac{1}{2}dx} + \frac{e^{x}x}{x} = \frac{e^{x}x}{x} + \frac{1}{2}dx} + \frac{1}{2}d$	5		Using line integral, compute the week two to for	
b Evaluate using divergence theorem: J _x ((x² - yx)i + (y² - zx)j + (z² - xy)k). fi ds where S is the surface of the rectangular parallelepiped 0 ≤ x ≤ a, 0 ≤ y ≤ b, 0 ≤ z ≤ c. OR			$F = 3r^2i + (2rz - v)i + zk$ when it may a solid for the work done by a force	
Section of the plane for \$\int_{0}(x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}\$. \$\hat{i} ds\$ where \$S\$ is the surface of the rectangular parallelepiped \$0 \leq x \leq a, \$0 \leq y \leq b\$, \$0 \leq z \leq c\$. OR OR Verify Green's theorem in the plane for \$\int_{0}(x^2 + y)dx - xy^2dy\$ taken around the boundary of the rectangle whose vertices are \$(0,0)\$, \$(a,0)\$, \$(a,b)\$ and \$(0,b)\$. Evaluate by Stokes theorem \$\int_{0}^{\int}((x+y)dx + (2x-z)dy + (y+z)dz)\$, \$C\$ is the boundary of the triangular surface with vertices \$(0,0,0)\$, \$(1,0,0)\$ and \$(1,1,0)\$. Obtain the radial displacement \$x\$ in a rotating disc at a distance \$s\$ from the axis, given by the differential equation \$\frac{d^2x}{dx^2} + \frac{1}{2} \frac{dx}{dx} + \frac{d^2y}{3} = \frac{6y}{dx} + 9y = \frac{e^{3x}}{x^2}\$ using method of variation of parameters. OR Obtain the solution of the differential equation \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ Solve \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x\$ given that \$y(0) = \frac{1}{9}\$, \$y'(0) = \frac{2}{9}\$ The following table gives the values of pressure \$P\$ and specific volume \$V\$ of saturated steam: \[\begin{array}{c} \begin{array}{c} \q \text{0} \\ \q \text{0} \\ \			to $(2,1,3)$ along the curve $x = 2t^2$ $y = t$ $y = 4t^2 - 4$ from the point $(0,0,0)$	00
If _s ((x² - yz)î + (y² - zx)ĵ + (z² - xy)k̂). ĥ ds where S is the surface of the rectangular parallelepiped 0 ≤ x ≤ a, 0 ≤ y ≤ b, 0 ≤ z ≤ c. OR Verify Green's theorem in the plane for ∮[(x² + y)dx - xy²dy] taken around the boundary of the rectangle whose vertices are (0,0), (a,0), (a,b) and (0,b). Evaluate by Stokes theorem ∮ _c ((x + y)dx + (2x - z)dy + (y + z)dz), C is the boundary of the triangular surface with vertices (0,0,0), (1,0,0) and (1,1,0). Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation differentia		ъ	Evaluate using divergence theorem:	08
OR Verify Green's theorem in the plane for \$\phi((x^2 + y)dx - xy^2dy)\$ taken around the boundary of the rectangle whose vertices are (0,0), (a,0), (a,b) and (0,b). Evaluate by Stokes theorem \$\phi_c((x+y)dx + (2x-z)dy + (y+z)dz)\$, \$C\$ is the boundary of the triangular surface with vertices (0,0,0), (1,0,0) and (1,1,0). Obtain the radial displacement \$x\$ in a rotating disc at a distance \$s\$ from the differential equation \$\frac{d^2y}{dx^2} + \frac{1}{2} \frac{dx}{dx} + \frac{dy}{3} \frac{1}{2} \frac{dx}{dx} + \frac{dy}{3} \frac{dx}{dx} \frac{dy}{dx} + \frac{dy}{dx} \frac{dy}{dx} + \frac{dy}{dx} \frac{dy}{dx} \frac{dy}{dx} + \frac{dy}{dx} \frac{dy}{				
Verify Green's theorem in the plane for \$\phi((x^2+y)dx-xy^2dy)\$ taken around the boundary of the rectangle whose vertices are (0,0), (a,0), (a,b) and (0,b). Evaluate by Stokes theorem \$\phi_c ((x+y)dx+(2x-z)dy+(y+z)dz)\$, \$C\$ is the boundary of the triangular surface with vertices (0,0,0), (1,0,0) and (1,1,0). Obtain the radial displacement \$x\$ in a rotating disc at a distance \$s\$ from the axis, given by the differential equation \(\frac{d^2x}{dx^2} + \frac{1}{2} \frac{dx}{dx} + \frac{2}{3} \frac{1}{2} \frac{dx}{s^2} \frac{1}{3} \frac{dx}{s^2}			J_s $(x - yz) + (y - zx) + (z - xy)k$, in ds where S is the surface of the	
Verify Green's theorem in the plane for \$\(\frac{6}{3}(x^2 + y)dx - xy^2dy \)\$ taken around the boundary of the rectangle whose vertices are \$(0,0)\$, \$(a,0)\$, \$(a,b)\$ and \$(0,b)\$. Evaluate by Stokes theorem \$\(\frac{6}{6} \) ((x + y)dx + (2x - z)dy + (y + z)dz \)\$, \$\(C \)\$ is the boundary of the triangular surface with vertices \$(0,0,0)\$, \$(1,0,0)\$ and \$(1,1,0)\$. Obtain the radial displacement \$x\$ in a rotating disc at a distance \$s\$ from the axis, given by the differential equation \$\frac{d^2x}{dx^2} + \frac{1}{3}dx + \frac{x}{3^2} = \frac{\log_{x,y}}{\sig_{x,y}} \sin(log_{x,s}) \text{ where } s > 0.\$ Solve \$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}\$ using method of variation of parameters. OR OR Obtain the solution of the differential equation \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9}\$ Solve \$(D^2 - 1)y = \sin x + (1 + x^2)e^x\$ OS The following table gives the values of pressure \$P\$ and specific volume \$V\$ of saturated steam: \[\begin{array}{c} \frac{1}{4} \frac{4}{3} \frac{5}{3} \frac{6}{3} \frac{7}{2} \frac{8}{2} \frac{20}{2} \frac{1}{184} \] Find the rate of change of pressure with respect to volume at \$V = 50\$ and \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			rectangular parallelepiped $0 \le x \le a$, $0 \le y \le b$, $0 \le z \le c$.	08
Verify Green's theorem in the plane for \$\(\frac{6}{3}(x^2 + y)dx - xy^2dy \)\$ taken around the boundary of the rectangle whose vertices are \$(0,0)\$, \$(a,0)\$, \$(a,b)\$ and \$(0,b)\$. Evaluate by Stokes theorem \$\(\frac{6}{6} \) ((x + y)dx + (2x - z)dy + (y + z)dz \)\$, \$\(C \)\$ is the boundary of the triangular surface with vertices \$(0,0,0)\$, \$(1,0,0)\$ and \$(1,1,0)\$. Obtain the radial displacement \$x\$ in a rotating disc at a distance \$s\$ from the axis, given by the differential equation \$\frac{d^2x}{dx^2} + \frac{1}{3}dx + \frac{x}{3^2} = \frac{\log_{x,y}}{\sig_{x,y}} \sin(log_{x,s}) \text{ where } s > 0.\$ Solve \$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}\$ using method of variation of parameters. OR OR Obtain the solution of the differential equation \$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9}\$ Solve \$(D^2 - 1)y = \sin x + (1 + x^2)e^x\$ OS The following table gives the values of pressure \$P\$ and specific volume \$V\$ of saturated steam: \[\begin{array}{c} \frac{1}{4} \frac{4}{3} \frac{5}{3} \frac{6}{3} \frac{7}{2} \frac{8}{2} \frac{20}{2} \frac{1}{184} \] Find the rate of change of pressure with respect to volume at \$V = 50\$ and \$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				
around the boundary of the rectangle whose vertices are (0,0), (a,0), (a,b) and (0,b). Evaluate by Stokes theorem $\oint_c ((x+y)dx + (2x-z)dy + (y+z)dz)$, C is the boundary of the triangular surface with vertices (0,0,0), (1,0,0) and (1,1,0). Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2y}{dx^2} + \frac{1}{2}\frac{dx}{dx} + \frac{x}{s^2} = \frac{\log_2 x}{s^2} \sin(\log_e s)$ where $s > 0$. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{1x}}{x^2}$ using method of variation of parameters. OR Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ O8 The following table gives the values of pressure P and specific volume V of saturated steam: $\frac{V}{P} = \frac{1}{304} + \frac{1}{276} + \frac{1}{250} + \frac{1}{204} + \frac{1}{184}$ Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2y}{dx^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: $v(1) = 2$, $v(3) = 10$, $v(4) = 17$. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time $3.8 \ units$. OR The population of a town is given by the table $\frac{Vears}{Population} = \frac{1961}{1971} = \frac{1971}{1981} = \frac{1991}{1994} = \frac{2001}{1994}$ Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985 . Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			OR	
around the boundary of the rectangle whose vertices are (0,0), (a,0), (a,b) and (0,b). Evaluate by Stokes theorem $\oint_C ((x+y)dx + (2x-z)dy + (y+z)dz)$, C is the boundary of the triangular surface with vertices (0,0,0), (1,0,0) and (1,1,0). Dobtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2y}{dz^2} + \frac{1}{2}\frac{dz}{dz} + \frac{x}{z} = \frac{\log_2 x}{s^2}\sin(\log_2 s)$ where $s > 0$. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{1x}}{x^2}$ using method of variation of parameters. OR Dobtain the solution of the differential equation $\frac{d^2y}{dz^2} + 2\frac{dy}{dz} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ The following table gives the values of pressure P and specific volume V of saturated steam: $V = \frac{1}{4} = $	16	a	Verify Green's theorem in the plane for \$11/2 1 10 de 1002 de 2 d	
b Evaluate by Stokes theorem ∮ _c ((x+y)dx + (2x-z)dy + (y+z)dz), C is the boundary of the triangular surface with vertices (0,0,0), (1,0,0) and (1,1,0). 7 a Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2x}{ds^2} + \frac{1}{2}\frac{dx}{ds} + \frac{x}{s^2} = \frac{\log_x x}{s^2} \sin(\log_x s)$ where s > 0. 8 a Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x$ given that y(0) = ½, y'(0) = ½ 8 b Solve (D² - 1)y = sin x + (1 + x²)e^x 9 a The following table gives the values of pressure P and specific volume V of saturated steam: V 40 50 60 70 80 P 304 276 250 204 184 Find the rate of change of pressure with respect to volume at V = 50 and displacement and the velocity of a rocket as a function of time is given as follows: v(1) = 2, v(3) = 10, v(4) = 17. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR			around the boundary of the rectangle whose vertices are $(0,0)$	
Evaluate by Stokes theorem $\oint_{\mathcal{C}} ((x+y)dx + (2x-z)dy + (y+z)dz)$, \mathcal{C} is the boundary of the triangular surface with vertices $(0,0,0)$, $(1,0,0)$ and $(1,1,0)$. 7 a Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2x}{ds^2} + \frac{1}{2}\frac{dx}{ds} + \frac{x}{s^2} = \frac{\log_2 x}{s^2}\sin(\log_2 s)$ where $s > 0$. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{2x}}{x^2}$ using method of variation of parameters. OR 8 a Obtain the solution of the differential equation $\frac{d^2y}{ds^2} + 2\frac{dy}{ds} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ 9 a The following table gives the values of pressure P and specific volume V of saturated steam: $\frac{V}{P} = \frac{40}{304} + \frac{50}{276} + \frac{60}{250} + \frac{70}{204} + \frac{80}{484}$ Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^3y}{ds^3}$ at $V = 70$. b The velocity of a rocket as a function of time is given as follows: $v(1) = 2, v(3) = 10, v(4) = 17.$ Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR 10 a The population of a town is given by the table $\frac{V}{Population} = \frac{1961}{1971} + \frac{1981}{1981} + \frac{1991}{1991} + \frac{2001}{1991} + \frac{1991}{1991} + \frac{2001}{1991} + \frac{1991}{1991} + 1991$			(a,b) and $(0,b)$.	08
The boundary of the triangular surface with vertices $(0,0,0)$, $(1,0,0)$ and $(1,1,0)$. 10		ь		00
Obtain the radial displacement x in a rotating disc at a distance s from the axis, gircle by the differential equation axis, gircle axis, gircle by the differential equation derived axis, gircle axis, gircle by the differential equation derived axis, gircle axis, g			the boundary of the triangular surface with wation (0.00) (1.00)	
Obtain the radial displacement x in a rotating disc at a distance s from the axis, given by the differential equation $\frac{d^2x}{ds^2} + \frac{1}{s} \frac{dx}{ds} + \frac{x}{s^2} = \frac{\log_s x}{s^2} \sin(\log_s s)$ where $s > 0$. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$ using method of variation of parameters. OR Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ O8 The following table gives the values of pressure P and specific volume V of saturated steam: \[\begin{align*}			(1.1.0).	00
the axis, given by the differential equation $\frac{d^2x}{ds^2} + \frac{1}{2}\frac{dx}{ds} + \frac{x}{s^2} = \frac{\log_e x}{s^2} \sin(\log_e s)$ where $s > 0$. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$ using method of variation of parameters. OR Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{9}$, $y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ O8 The following table gives the values of pressure P and specific volume V of saturated steam: $ \frac{V}{P} = \frac{40}{304} + \frac{50}{276} + \frac{60}{250} + \frac{70}{204} + \frac{80}{184} $ Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2y}{dP^2}$ at $V = 70$. b The velocity of a rocket as a function of time is given as follows: $ v(1) = 2, v(3) = 10, v(4) = 17. \text{Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula.} Also find the velocity at time 3.8 units. OR The population of a town is given by the table \frac{Years}{Population in thousands} = \frac{1961}{1996} = \frac{1971}{1981} = \frac{1991}{1991} = \frac{2001}{1991} = \frac{1991}{1991} = $				08
by the differential equation $\frac{d^2x}{ds^2} + \frac{1}{2}\frac{dx}{ds} + \frac{x}{s^2} = \frac{\log_e s}{s^2} \sin(\log_e s) \text{ where } s > 0.$ $Solve \frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2} \text{ using method of variation of parameters.}$ 08 08 08 08 08 08 08 08	7	a	Obtain the radial displacement x in a rotating disc at a distance s from	
b Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$ using method of variation of parameters. OR Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ O8 The following table gives the values of pressure P and specific volume V of saturated steam: $V = \frac{40}{9} = \frac{50}{250} = \frac{60}{204} = \frac{70}{180}$ Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^3y}{dP^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: $v(1) = 2, v(3) = 10, v(4) = 17. \text{ Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 \text{ units}. OR The population of a town is given by the table \frac{Years}{Population in thousands} = \frac{1961}{19.96} = \frac{1971}{39.65} = \frac{1991}{58.81} = \frac{2001}{77.21} = \frac{94.61}{94.61} Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation f(x) = 0$			dals, given by the differential equation	
OR Obtain the solution of the differential equation $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9}$ Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ O8 The following table gives the values of pressure P and specific volume V of saturated steam: $V = \frac{40}{50} = \frac{50}{50} = \frac{50}{204} = \frac{50}{184}$ Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2y}{dP^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: $v(1) = 2, v(3) = 10, v(4) = 17. \text{ Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 \text{ units}. OR The population of a town is given by the table \frac{V}{Population} = \frac{1961}{Population} = \frac{1971}{1981} = \frac{1991}{1991} = \frac{2001}{2001} \frac{V}{Population} = \frac{1961}{1990} = \frac{1971}{1990} = \frac{1991}{1990} = \frac{1991}{1990} Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation f(x) = 0$			$\frac{d^2x}{ds^2} + \frac{1}{s}\frac{dx}{ds} + \frac{x}{s^2} = \frac{\log_e s}{s^2}\sin(\log_e s)$ where $s > 0$.	100
Obtain the solution of the differential equation \[\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9} \] Solve \((D^2 - 1)y = \sin x + (1 + x^2)e^x\) The following table gives the values of pressure \(P\) and specific volume \(V\) of saturated steam: \[\begin{align*} a		b	Solve $\frac{d^2y}{d^2y} = 6\frac{dy}{dy} + 9y = \frac{e^{3x}}{2}$ using method of variation of	08
Obtain the solution of the differential equation \[\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9} \] Solve \((D^2 - 1)y = \sin x + (1 + x^2)e^x\) The following table gives the values of pressure \(P\) and specific volume \(V\) of saturated steam: \[\begin{align*} a			dx^2 dx dx dx dx dx dx dx dx	08
Obtain the solution of the differential equation \[\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + y = e^{2x} - \cos^2 x \text{ given that } y(0) = \frac{1}{9}, y'(0) = \frac{2}{9} \] Solve \((D^2 - 1)y = \sin x + (1 + x^2)e^x\) The following table gives the values of pressure \(P\) and specific volume \(V\) of saturated steam: \[\begin{align*} a			OP	
b Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ The following table gives the values of pressure P and specific volume V of saturated steam: \[\begin{align*} V & 40 & 50 & 60 & 70 & 80 \\ P & 304 & 276 & 250 & 204 & 184 \end{align*} \] Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2y}{dP^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: \[v(1) = 2, v(3) = 10, v(4) = 17. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table \[\begin{align*} Years & 1961 & 1971 & 1981 & 1991 & 2001 \\ Population in thousands & 19.96 & 39.65 & 58.81 & 77.21 & 94.61 \\ Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. \end{align*} \] Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			OK .	
b Solve $(D^2 - 1)y = \sin x + (1 + x^2)e^x$ The following table gives the values of pressure P and specific volume V of saturated steam: \[\begin{align*} V & 40 & 50 & 60 & 70 & 80 \\ P & 304 & 276 & 250 & 204 & 184 \end{align*} \] Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2 y}{dP^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: \[v(1) = 2, v(3) = 10, v(4) = 17. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table \[\begin{align*} Years & 1961 & 1971 & 1981 & 1991 & 2001 \\ Population in thousands & 19.96 & 39.65 & 58.81 & 77.21 & 94.61 \\ Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. \end{align*} \] Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$	8	a	Obtain the solution of the differential equation	
The following table gives the values of pressure P and specific volume V of saturated steam: V 40 50 60 70 80 P 304 276 250 204 184 Find the rate of change of pressure with respect to volume at V = 50 and d ² V at V = 70. D The velocity of a rocket as a function of time is given as follows: v(1) = 2, v(3) = 10, v(4) = 17. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR 10 a The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation f(x) = 0			$\frac{d^2y}{d^2y} + 2\frac{dy}{dy} + y = e^{2x} - \cos^2 x$ given that $y(0) = \frac{1}{2} y'(0) - \frac{2}{2}$	
The following table gives the values of pressure P and specific volume V of saturated steam: V 40 50 60 70 80 P 304 276 250 204 184 Find the rate of change of pressure with respect to volume at V = 50 and		h	Solve $(D^2 - 1)y = \sin x + (1 + x^2) + x$	
of saturated steam: \[\begin{array}{c c c c c c c c c c c c c c c c c c c		-	$501/c (D-1)y - 5111x + (1+x^{-})e^{-x}$	08
of saturated steam: \[\begin{array}{c c c c c c c c c c c c c c c c c c c	9	a	The following table gives the values of pressure P and specific values V	
Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2V}{d\rho^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: $v(1) = 2$, $v(3) = 10$, $v(4) = 17$. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$				100
Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2V}{dP^2}$ at $V = 70$. The velocity of a rocket as a function of time is given as follows: $v(1) = 2$, $v(3) = 10$, $v(4) = 17$. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table $Vears$ 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$				
Find the rate of change of pressure with respect to volume at $V = 50$ and $\frac{d^2V}{d\rho^2}$ at $V = 70$. 10 The velocity of a rocket as a function of time is given as follows: 10 $V(1) = 2$, $V(3) = 10$, $V(4) = 17$. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. 10 a The population of a town is given by the table 10 A The population in thousands 19.96 19.71 1981 1991 2001 19.01 19.00 1				
b The velocity of a rocket as a function of time is given as follows: v(1) = 2, v(3) = 10, v(4) = 17. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation f(x) = 0				
The velocity of a rocket as a function of time is given as follows: v(1) = 2, v(3) = 10, v(4) = 17. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation f(x) = 0				
v(1) = 2, $v(3) = 10$, $v(4) = 17$. Obtain the functional representation of velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$		b	mr .	08
velocity as a function of time using Lagrange's interpolation formula. Also find the velocity at time 3.8 units. OR The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$		D		
Also find the velocity at time 3.8 units. OR The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			velocity as a function of time using Lagrange's interpolation formula	
The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. b Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			Also find the velocity at time 38 units	00
The population of a town is given by the table Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. b Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$				08
Years 1961 1971 1981 1991 2001 Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. b Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$				
Years19611971198119912001Population in thousands19.9639.6558.8177.2194.61Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985.bApply Lagrange's formula inversely to find a root of the equation $f(x) = 0$	10	a	The population of a town is given by the table	
Population in thousands 19.96 39.65 58.81 77.21 94.61 Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. b Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$				The same
Using appropriate interpolation formula, calculate the increase in population from the year 1955 to 1985. b Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			Danulation 1 1 1 1000	
b population from the year 1955 to 1985. Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			Using appropriate interpolation formula, calculate the increase in	
b Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$			population from the year 1955 to 1985.	08
given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$, $f(42) = 18$.		b	Apply Lagrange's formula inversely to find a root of the equation $f(x) = 0$	
			given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$, $f(42) = 18$.	08