	Attempt the following
Q.1	Attempt the following
	1) Derive Cauchy – Riemann equations for complex function $w = f(z)$ in polar form.
	2) Define harmonic function, Show that $u = \frac{1}{2}\log(x^2 + y^2)$ is harmonic and
	determine its conjugate function.
Q.2	Attempt the following
	1) Derive Cauchy-Rieman equation for a complex function $W = f(z)$ In polar form
	.Hence deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} = 0.$
	2) If $w = u + iv$ represent the complex potential function for an electric field and
	$u = 3x^2y - y^3$, determine the function v.
Q.3	Attempt the following
	1) If f(z) is analytic function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) f(z) ^2 = 4 f'(z) ^2$
	2) Evaluate $\int_{0}^{1+i} (x^2 - iy) dz$ along the path $(i)y = x(ii)y = x^2$
Q.4	Attempt the following
	1) Find the image of infinite strip $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation $w = \frac{1}{z}$ also
	show the region graphically. $3+i$
	Define line integral .Evaluate $\int_{0}^{3+i} z^2 dz$ along (i) the line $y = \frac{x}{3}$; (ii) the parabola 2)
	$x = 3y^2$
Q.5	Attempt the following
	1) Define bilinear transformation, Show that the transformation $w = \frac{2z+3}{z-4}$ maps the circle onto the straight line $4u+3=0$
	2) State Cauchy integral theorem and Cauchy integral formula. Evaluate
	$\iint_{c} \frac{\sin \pi z^{2} + \cos \pi z^{2}}{(z-1)(z-2)} dz \text{, where} c: z = 3$
Q.6	Attempt the following
	 Determine the analytic function whose real part is u = e^{-x} (x sin y - y cos x). Find the Bi-linear transformation, which maps the points z = -1, i, 1 into the points w = 1, i, -1.
<u> </u>	7.7

Maths – II

Q.7	Attempt the following
	1) Find the Bi-linear transformation which maps the points $z = 1, i, -i$ into the Points $w = 0, 1, \infty$.
	2) Use Cauchy's integral formula to evaluate $\int_{C} \frac{e^{2z}}{(z+1)^4} dz$, where <i>C</i> is the circle
	z =2.
Q.8	Attempt the following
	1) Prove that $f(z) = e^{2z}$ is analytic every in the plane and find its derivative.
	2) Find the image of $ z - 2i = 2$ under the mapping $w = \frac{1}{z}$
Q.9	Attempt the following
	1) Evaluate $\int_{1-i}^{2+3i} (z^2 + z) dz$ along the line joining the points (1,-1) and (2,3).
	2) Evaluate $\oint_C \frac{2z+1}{z^2+z} dz$; where <i>C</i> is $ z = \frac{1}{2}$.
Q.10	Attempt the following
	1) If $w = u + iv$ represent the complex potential function for an electric field and $u = 3x^2y - y^3$, determine the function v .
	2) State the Residue theorem and evaluate $\iint_C \frac{2z+1}{(2z-1)^2} dz$, where C is the circle
	z =1.
Q.11	Attempt the following
	1) Prove that $f(z) = e^{2z}$ is analytic every in the plane and find its derivative.
	2) Expand $f(z) = \frac{z}{(z+1)(z+2)}$ about $z = -2$.
Q.12	Attempt the following
	1) Evaluate $\int_{0}^{3+i} z^2 dz$ along (i) the line $y = \frac{x}{3}$ (ii) the parabola $x = 3y^2$
	2) Find the image of the upper half plane under the transformation $w = \frac{z}{i-z}$.
Q.13	Attempt the following $l = \frac{l - 2}{2}$
	1) Find the Bi-linear transformation which maps the points $z = 1, i, -i$ into the Points

	$w = 0, 1, \infty$.
	2) Determine the analytic function whose real part is $y + e^x \cos y$.
Q.14	Attempt the following
	2 . 1
	1) Evaluate $\int_{C} \frac{z^2 + 1}{z(2z+1)} dz$ where C is $ z = 1$.
	2) Under the transformation $w = \frac{1}{z}$ find the image of $x^2 - y^2 = 1$.
Q.15	Attempt the following
	1) Find the analytic function whose imaginary part is $e^x \sin y$
	2) Under the transformation $w = \frac{1}{z}$ find the image of $ z - 2i = 2$.
Q.16	Attempt the following
	$-7^2 + 1$
	1) Evaluate $\int_C \frac{z^2 + 1}{z(2z+1)} dz$ where C is $ z = 1$.
	2) Under the transformation, $w = \frac{1}{2}$ find the image of $x^2 - y^2 = 1$.
	2) Under the transformation, $w = -$ find the image of $x - y = 1$.
Q.17	Evaluate
	(i) $\iint_{c} \frac{e^{2z}}{(z+1)^{4}} dz$; where $c: z = 4$
	(ii) $ \iint_{c} \frac{e^{z}}{(z+1)^{4}(z-2)} dz ; \text{ where } c : z-1 = 3 $
Q.18	Attempt the following
	3) Derive Cauchy – Riemann equations for complex function $w = f(z)$ in polar form.
	4) Define harmonic function, Show that $u = \frac{1}{2}\log(x^2 + y^2)$ is harmonic and
	determine its conjugate function.
Q.19	Attempt the following
	2) Derive Couchy Diemon equation for a complex function $W = f(z)$ is rate from
	3) Derive Cauchy-Rieman equation for a complex function $W = f(z)$ In polar form
	.Hence deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} = 0.$
	4) If $w = u + iv$ represent the complex potential function for an electric field and
	$u = 3x^2y - y^3$, determine the function v.
Q.20	Attempt the following

Maths – II

Each question is of equal Marks (10 Marks)	
--	--

-	
	3) If f(z) is analytic function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) f(z) ^2 = 4 f'(z) ^2$
	4) Evaluate $\int_{0}^{1+i} (x^2 - iy) dz$ along the path $(i)y = x(ii)y = x^2$
Q.21	Attempt the following
	3) Find the image of infinite strip $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation $w = \frac{1}{z}$ also show the region graphically.
	Define line integral .Evaluate $\int_{0}^{3+i} z^2 dz$ along (i) the line $y = \frac{x}{3}$; (ii) the parabola 4)
	$x = 3y^2$
Q.22	Attempt the following
	3) Define bilinear transformation, Show that the transformation $w = \frac{2z+3}{z-4}$ maps the
	circle onto the straight line $4u + 3 = 0$
	4) State Cauchy integral theorem and Cauchy integral formula. Evaluate
	$\iint_{c} \frac{\sin \pi z^{2} + \cos \pi z^{2}}{(z-1)(z-2)} dz \qquad \text{, where} c: z = 3$
Q.23	Attempt the following
	 3) Determine the analytic function whose real part is u = e^{-x}(x sin y - y cos x). 4) Find the Bi-linear transformation, which maps the points z = -1, i, 1 into the points w = 1, i, -1.
Q.24	Attempt the following
	3) Find the Bi-linear transformation which maps the points $z = 1, i, -i$ into the Points $w = 0, 1, \infty$.
	4) Use Cauchy's integral formula to evaluate $\int_{C} \frac{e^{2z}}{(z+1)^4} dz$, where <i>C</i> is the circle
	z =2 .
Q.25	Attempt the following
	3) Prove that $f(z) = e^{2z}$ is analytic every in the plane and find its derivative.
	4) Find the image of $ z - 2i = 2$ under the mapping $w = \frac{1}{z}$
Q.26	Attempt the following
L	

	2.2
	3) Evaluate $\int_{1-i}^{2+3i} (z^2 + z) dz$ along the line joining the points (1,-1) and (2,3).
	4) Evaluate $\oint_C \frac{2z+1}{z^2+z} dz$; where <i>C</i> is $ z = \frac{1}{2}$.
Q.27	Attempt the following
	3) If $w = u + iv$ represent the complex potential function for an electric field and $u = 3x^2y - y^3$, determine the function v .
	4) State the Residue theorem and evaluate $\iint_C \frac{2z+1}{(2z-1)^2} dz$, where <i>C</i> is the circle
	z =1.
Q.28	Attempt the following
	3) Prove that $f(z) = e^{2z}$ is analytic every in the plane and find its derivative.
	4) Expand $f(z) = \frac{z}{(z+1)(z+2)}$ about $z = -2$.
Q.29	Attempt the following
	3) Evaluate $\int_{0}^{3+i} z^2 dz$ along (i) the line $y = \frac{x}{3}$ (ii) the parabola $x = 3y^2$
	4) Find the image of the upper half plane under the transformation $w = \frac{z}{i-z}$.
Q.30	Attempt the following
	3) Find the Bi-linear transformation which maps the points $z = 1, i, -i$ into the Points $w = 0, 1, \infty$.
	4) Determine the analytic function whose real part is $y + e^x \cos y$.
Q.31	Attempt the following
	3) Evaluate $\int_{C} \frac{z^2 + 1}{z(2z+1)} dz$ where C is $ z = 1$.
	4) Under the transformation $w = \frac{1}{z}$ find the image of $x^2 - y^2 = 1$.
Q.32	Attempt the following
	3) Find the analytic function whose imaginary part is $e^x \sin y$
	4) Under the transformation $w = \frac{1}{z}$ find the image of $ z - 2i = 2$.

Q.33	Attempt the following								
	3) Evaluate $\int_{C} \frac{z^2 + 1}{z(2z+1)} dz$ where C is $ z = 1$.								
	4) Under the transformation, $w = \frac{1}{7}$ find the image of $x^2 - y^2 = 1$.								
Q.34	Evaluate								
	(i) $\iint_{c} \frac{e^{2z}}{(z+1)^4} dz$; where $c: z = 4$								
	(ii) $\iint_{c} \frac{e^{z}}{(z+1)^{4}(z-2)} dz$; where $c: z-1 = 3$								
Q.35	Using Newton's interpolation formula, find the values of f (22) from the following data.								
	x202530354045f(x)354332291260231204								
Q.36	Using Lagrange's interpolation formula to find $f(5)$ from following data.								
	x 1 2 3 4 7 f(x) 2 4 8 16 128								
Q.37	Evaluate $\int_{0}^{6} \frac{dx}{1+x^2}$ with h = 1 by using Simpson's 3/8 rule.								
Q.38	Find $y'(0)$ and y'' from the following table.								
	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$								
Q.39									
	Solve $y_{n+2} - 2y_{n+1} + y_n = 3n + 4$								
Q.40	Solve the following equations by Gauss elimination method.								
	x + 4y - z = -5								
	x + y - 6z = -12								
	3x - y - z = 4								
Q.41	Solve the following equations by Gauss-Jordan method.								

x + y + z =	= 9								
Using Newton's forward interpolation formula, find the value of $f(5)$ if									
	X	4	6	8	1	10	12		
	f(x)	1	3	8	1	16	20		
Use Lagr	ange's for	mula to fir	nd the val	ue of y at x =	= 5 from	the fol	llowing da	ata.	
	X	1	2	3	2	1	7		
	у	2	4	8	1	16	128		
Using Picar	rd's metho	od, find the	e solution	of the diffe	rential e	quatio	n $\frac{dy}{dx} = x$	$-y^2$ g	given that
							ax		
2									
					= 0.1 to	o five pl	aces of d	ecimal	for the
differential equation $\frac{dy}{dx} = x^2 y - 1; y(0) = 1.$									
		ах							
usi	ing Newto	n's forwar	d interpo	lation formu	ıla , Finc	sin 52	° from fo	llowing	g data
			-0			•			
		sın 4	5	sin 50°		sin 55		s1n 6	0.
				0.7660					
Us	ing Lagrar	ige's inter	polation f	ormula find	the valu	ie of y v	when x =	10 fron	n the
	fo	llowing ta	ble						
		X		5	6		9	1	1
		У		12	13		14	1	6
	2x-3y+ $3x+4y+$ Using Ne Using Ne Use Lagr Using Pican $y(0) = 1 u$ Using Taylo differentia	x f(x) Use Lagrange's for x y y Using Picard's method y y(0) = 1 up to second y Using Taylor's series differential equation using Newto using Newto Using Lagrand Using Lagrand	2x - 3y + 4z = 13 $3x + 4y + 5z = 40$ Using Newton's forward interval x 4 $f(x) 1$ Use Lagrange's formula to find x 1 $y 2$ Using Picard's method, find the y(0) = 1 up to second approxic Using Taylor's series method, find differential equation $\frac{dy}{dx} = x^2$ using Newton's forward $\frac{\sin 4x}{0.707}$ Using Lagrange's interval following ta	$2x - 3y + 4z = 13$ $3x + 4y + 5z = 40$ Using Newton's forward interpolation $\frac{x 4 6}{f(x) 1 3}$ Use Lagrange's formula to find the value $\frac{x 1 2}{y 2 4}$ Using Picard's method, find the solution $y(0) = 1 \text{ up to second approximation.}$ Using Taylor's series method, find the value differential equation $\frac{dy}{dx} = x^2y - 1; y(0)$ using Newton's forward interpol $\frac{\sin 45^\circ}{0.7071}$ Using Lagrange's interpolation for the value $\frac{x 1}{x 1} = \frac{x^2y}{y} + \frac{1}{y} = \frac{1}{y}$	2x-3y+4z = 13 $3x+4y+5z = 40$ Using Newton's forward interpolation formula, fin x 4 6 8 $f(x) 1 3 8$ Use Lagrange's formula to find the value of y at x = 1 2 3 y 2 4 8 8 4 8 4 8 4 8 4 8 4 8 4 8 4 8 4 8	2x-3y+4z = 13 $3x+4y+5z = 40$ Using Newton's forward interpolation formula, find the value x is a standard structure of x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from x is a standard structure of y at $x = 5$ from $y(0) = 1$ up to second approximation. Using Taylor's series method, find the value of y at $x = 0.1$ to differential equation $\frac{dy}{dx} = x^2y - 1$; $y(0) = 1$. using Newton's forward interpolation formula , Find x is a structure of y at $x = 0.1$ to x is a structure of y at $x = 0.1$ to x is a structure of y at $x = 0.1$ to x is a structure of y at $x = 0.1$ to x is a structure of y at $x = 0.1$ to $x = 0.1$. Using Newton's forward interpolation formula , Find x is a structure of y at $x = 0.1$ to $x = 0.1$. Using Lagrange's interpolation formula find the value following table is a structure of x is a structure of	$2x-3y+4z = 13$ $3x+4y+5z = 40$ Using Newton's forward interpolation formula, find the value of $x 4 6 8 10$ $f(x) 1 3 8 16$ Use Lagrange's formula to find the value of y at x = 5 from the following table Using Picard's method, find the solution of the differential equation $y(0) = 1$ up to second approximation. Using Taylor's series method, find the value of y at x = 0.1 to five pl differential equation $\frac{dy}{dx} = x^2y - 1; y(0) = 1.$ Using Newton's forward interpolation formula, Find sin 52 $\frac{\sin 45^\circ \qquad \sin 50^\circ \qquad \sin 55^\circ \qquad 0.7071 \qquad 0.7660 \qquad 0.8192}$ Using Lagrange's interpolation formula find the value of y w following table $\frac{X \qquad 5 \qquad 6}{x \qquad 1 \qquad $	$2x - 3y + 4z = 13$ $3x + 4y + 5z = 40$ Using Newton's forward interpolation formula, find the value of $f(5)$ if $x 4 6 8 10 12$ $f(x) 1 3 8 16 20$ Use Lagrange's formula to find the value of y at x = 5 from the following data is the value of y at x = 5 from the following data is the value of y at x = 5 from the following data is the value of y at x = 5 from the following data is the value of y at x = 5 from the following data is the value of y at x = 0.1 to five places of d differential equation $\frac{dy}{dx} = x^2y - 1; y(0) = 1.$ Using Newton's forward interpolation formula , Find sin 52° from formula using Newton's forward interpolation formula , Find sin 52° from formula using Lagrange's interpolation formula find the value of y when x = following table $\frac{x 5 6 9}{x 5 6 9}$	$2x - 3y + 4z = 13$ $3x + 4y + 5z = 40$ Using Newton's forward interpolation formula, find the value of $f(5)$ if $\boxed{x 4 6 8 10 12}{f(x) 1 3 8 16 20}$ Use Lagrange's formula to find the value of y at x = 5 from the following data. $\boxed{x 1 2 3 4 7}{y 2 4 8 16 128}$ Using Picard's method, find the solution of the differential equation $\frac{dy}{dx} = x - y^2$ g $y(0) = 1$ up to second approximation. Using Taylor's series method, find the value of y at x = 0.1 to five places of decimal differential equation $\frac{dy}{dx} = x^2y - 1$; $y(0) = 1$. Using Newton's forward interpolation formula , Find sin 52° from following $\frac{\sin 45^\circ \sin 50^\circ \sin 55^\circ \sin 6}{0.7071 0.7660 0.8192 0.866}$ Using Lagrange's interpolation formula find the value of y when x = 10 from following table $\boxed{X 5 6 9 1}$

Q.48	Evaluate $\int_{0}^{6} \frac{dx}{1+x}$	$\frac{x}{x^2}$ with	ı h = 1 by ı	using Simp	oson's 1/3	rule.				
0.40	Circon that									
Q.49	Given that									
		х	1.0	1.1	1.2	1.3	1.4	1.5	1.6	
		Y	7.989	8.403	8.751	9.129	9.451	9.750	10.031	
					I	1				
		Find	$\frac{dy}{dx} \& \frac{d^2y}{dx^2}$	$\frac{y}{2}$ at y= 1.	5					
Q.50	Evaluate the lir	ne integ	ral $\int [(y +$	-3z)dx +	(2z+x)dz	y + (3x +	(2y)dz]wt	nere C is th	ne square	
	formed by the	lines y	$=\pm 1$ and	$x = \pm 1$.						
Q.51	Evaluate the lir	ne integ	ral $\int [(x^2 - x^2)]$	+xy)dx +	$-(x^2 + y^2)$	dy whe	re C is the	square fo	rmed by	
	the lines $y=\pm$	1 and 2	$c = \pm 1.$							
Q.52	Verify Green's theorem for $\oint (x + y)dx + 2xy dy$, Where C is the boundary of the region									
	bounded by									
	x = 0, y = 0, x = a, y = b.									
Q.53	Using Green's	Theorer	n, evaluat	$e\int (x^2 y dx)$	$(x + x^2 dy)$, where C	is the bou	indary des	cribed	
	counter clockw	\tilde{c} counter clockwise of the triangle with vertices (0, 0) (1, 0) & (1, 1).								
Q.54	Verify Green's	theoren	n for $\oint_{C} (3x)$	$(x-8y^2)d$	x + (4y -	6 <i>xy</i>)dy ,	Where C is	s the boun	dary of the	
	region bounde	d by x =	0, y = 0 ar	nd x + y =	1.					
Q.55	Verify Diverger planes x = 0,	nce's the	eorem for	$\vec{F} = 4xyz$	$z_i - y^2 j +$	- <i>yz k</i> ove	r the cube	e bounded	by the	
	x = 2, y =0, y =	2, z = 0,	z = 2.							
Q.56	Verify Gauss Di	vergen	ce theorer	n for \vec{F} =	$\left(x^2 - yz\right)$	$\hat{i} + (y^2 - y^2)$	$(zx)\hat{j}+(z)$	$(k^2 - xy)\hat{k}$	taken over	

	the rectangular parallopied $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$.
Q.57	Evaluate $\iint_{S} (\nabla \times \overline{F}) \cdot d\overline{S}$ using Stoke's theorem when $\overline{F} = (2x - y, -yz^2, -y^2z)$. Where S
	is the upper hemisphere of the sphere $x^2 + y^2 + z^2 = a^2$ and C is its boundary.
Q.58	Evaluate $\oint \vec{F} \cdot d\vec{r}$ by Stoke's theorem, where $\vec{F} = y^2 \hat{i} + x^2 \hat{j} - (x+z) \hat{k}$ and c is the
	boundary of the triangle with vertices at $(0,0,0)$, $(1,0,0)$ & $(1,1,0)$.
Q.59	Evaluate $\oint_C (xydx + xy^2dy)$ by Stoke's theorem taking C to be a square in the xy-plane with
	vertices
	(1,0),(-1,0),(0,1) and (0,-1)
Q.60	Evaluate the line integral $\int_{C} [(y+3z)dx + (2z+x)dy + (3x+2y)dz]$ where C is the square
	formed by the lines $y=\pm 1$ and $x=\pm 1$.
Q.61	Evaluate the line integral $\int_{a} \left[(x^2 + xy)dx + (x^2 + y^2)dy \right]$ where C is the square formed by
	the lines $y=\pm 1$ and $x=\pm 1$.
Q.62	Verify Green's theorem for $\oint_C (x + y)dx + 2xy dy$, Where C is the boundary of the region
	bounded by
	x = 0, y = 0, x = a, y = b.
Q.63	Using Green's Theorem, evaluate $\int_{C} (x^2 y dx + x^2 dy)$, where C is the boundary described
	counter clockwise of the triangle with vertices $(0, 0)$ $(1, 0)$ & $(1, 1)$.
Q.64	Verify Green's theorem for $\oint_C (3x - 8y^2) dx + (4y - 6xy) dy$, Where C is the boundary of the
	region bounded by $x = 0$, $y = 0$ and $x + y = 1$.
Q.65	Verify Divergence's theorem for $\vec{F} = 4xyz i - y^2 j + yz k$ over the cube bounded by the
	planes x = 0, x = 2, y =0, y = 2, z = 0, z = 2.

Q.66	Varify Course Divergence theorem for $\vec{E} = (x^2, y^2) \hat{i} + (x^2, y^2) \hat{i} + (x^2, y^2) \hat{i}$ taken over								
Q.00	Verify Gauss Divergence theorem for $\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ taken over								
	the rectangular parallopied $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$.								
Q.67	Evaluate $\iint_{S} (\nabla \times \overline{F}) \cdot d\overline{S}$ using Stoke's theorem when $\overline{F} = (2x - y, -yz^2, -y^2z)$. Where S								
	is the upper hemisphere of the sphere $x^2 + y^2 + z^2 = a^2$ and C is its boundary.								
Q.68	Evaluate $\oint \vec{F} \cdot d\vec{r}$ by Stoke's theorem, where $\vec{F} = y^2 \hat{i} + x^2 \hat{j} - (x+z)\hat{k}$ and c is the								
	boundary of the triangle with vertices at $(0,0,0),(1,0,0)$ & $(1,1,0)$.								
Q.69	Evaluate $\oint (xydx + xy^2 dy)$ by Stoke's theorem taking C to be a square in the xy-plane with								
	vertices								
	Vertices								
	(1,0),(-1,0),(0,1) and (0,-1)								
Q.69	(a) Find the directional derivative of $\phi = 2x^2 + 3y^2 + z^2$ at point (2,1,3) in the direction of								
	the vector (1,-2,0).								
	(b) Find the directional derivative of $\phi = xy^2 + yz^3$ at point (1,-1,1) in the direction of the vector (1,2,2).								
Q.69	(a) Find the directional derivative of $\phi = xy^2 + yz^3$ at point (1,-1,1) along the upward								
	normal to the Surface $x^2 + y^2 + z^2 = 9$ at (1,2,2).								
	1								
	(b) Find the directional derivative of $\frac{1}{r}$ in the direction of \vec{r} , where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$.								
Q.70	(a) An electron moves such that its velocity is always perpendicular to its radius vector .Show that its path is circle.								
	(b) Find the velocity and acceleration of the particle which moves along the curve								
	$x = 2 \sin 3t$, $y = 2 \cos 3t$, $z = 8t$, $t > 0$. Also find the magnitude of the velocity and acceleration								
Q.71	(a) Show that div $(\phi \vec{A}) = \phi(div \vec{A}) + (grad \phi) \cdot \vec{A}$.								
	(b) Prove that div(grad r^n) = $\nabla^2(r^n) = n(n+1)r^{n-2}$, where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$.								

Q.72	(a) Prove that $\nabla^2 \left(\frac{1}{r} \right) = 0$, where $\overline{r} = x\overline{i} + y\overline{j} + z\overline{k}$.
	(b) For a constant vector \overline{a} , show that $\nabla \times \left(\frac{\overline{a} \times \overline{r}}{r^3}\right) = -\frac{\overline{a}}{r^3} + \frac{3(\overline{a} \cdot \overline{r})}{r^5} - \frac{\overline{a}}{r}$, where $\overline{r} = x\overline{i} + y\overline{j} + z\overline{k}$.
	r = xi + yj + zk
Q.73	(a) Prove that $\nabla^2 f(r) = f''(r) + \frac{2}{r}f'(r)$, where $\overline{r} = x\overline{i} + y\overline{j} + z\overline{k}$.
	(b) Show that the vector field $\vec{F} = \frac{\vec{r}}{r^3}$ is irrotational as well as solenoidal
Q.74	(a) A fluid motion is given by $\vec{v} = (y+z)\hat{i} + (z+x)\hat{j} + (x+y)\hat{k}$. Is the fluid motion irrotational?
	(b) Show that $\vec{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$ is both irrotational and solenoidal
Q.75	Show that $\vec{F} = (y \sin z - \sin x)i + (x \sin z + 2yz)j + (xy \cos z + y^2)k$ is irrotational. Find
	scalar field ϕ such that $\overrightarrow{F}\!=\! abla\phi$
Q.76	Show that $\vec{F} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational. Find scalar field ϕ
	such that $\overrightarrow{F} = \nabla \phi$