GUJARAT UNIVERSITY

B.E. SEM – 4 (EC IC BM)

Question Bank

Maths – II

Each question is of equal Marks (10 Marks)

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 $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\lvert f(z)\rvert^2=4\lvert f'(z)\rvert^2$ 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. 2) Define line integral .Evaluate $\int_0^{3+i} z^2dz$ along (i) the line $y=\frac{x}{3}$; (ii) the parabola $x=3y^2$
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 $\oint_c \frac{\sin\pi z^2+\cos\pi z^2}{(z-1)(z-2)}dz$, where $c:\lvert z\rvert=3$
Q.6	Attempt the following 1) Determine the analytic function whose real part is

Each question is of equal Marks (10 Marks)

	$u = e^{-x}(x\sin y - y\cos x)$. 2) Find the Bi-linear transformation, which maps the points $z = -1, i, 1$ into the points $w = 1, i, -1$.
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 *C* is the circle $\lvert z \rvert = 2$.
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 $\lvert z - 2i \rvert = 2$ 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 C *is* $\lvert z \rvert = \frac{1}{2}$.
Q.10	Attempt the following 1) If $w = u + iv$ represent the complex potential function for an electric field and $u = 3x^2 y - y^3$, determine the function v . 2) State the Residue theorem and evaluate $\oint_C \frac{2z+1}{(2z-1)^2} dz$, where *C* is the circle $\lvert z \rvert = 1$.
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

GUJARAT UNIVERSITY

B.E. SEM – 4 (EC IC BM)

Question Bank

Maths – II

Each question is of equal Marks (10 Marks)

	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 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 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 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.17	Evaluate (i) $\oint_c \frac{e^{2z}}{(z+1)^4} dz$; where $c : \|z\| = 4$ (ii) $\oint_c \frac{e^z}{(z+1)^4 (z-2)} dz$; 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

Each question is of equal Marks (10 Marks)

	and determine its conjugate function.
Q.19	Attempt the following 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 $u = 3x^2 y - y^3$, determine the function v.
Q.20	Attempt the following 3) If f(z) is analytic function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)\lvert f(z)\rvert^2 = 4\lvert f'(z)\rvert^2$ 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. 4) Define line integral .Evaluate $\int_0^{3+i} z^2 dz$ along (i) the line $y = \frac{x}{3}$; (ii) the parabola $x = 3y^2$
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 $\oint_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$, where $c : \lvert z\rvert = 3$
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

Each question is of equal Marks (10 Marks)

	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 *C* 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 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 C *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 $\oint_C \frac{2z+1}{(2z-1)^2}dz$, where *C* 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 $\int_0^{3+i} z^2dz$ 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 $w=\frac{z}{i-z}$.

GUJARAT UNIVERSITY
B.E. SEM – 4 (EC IC BM)
Question Bank
Maths – II

Each question is of equal Marks (10 Marks)

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, $w=\frac{1}{z}$ find the image of $x^2-y^2=1$.
Q.34	Evaluate (i) $\oint_c \frac{e^{2z}}{(z+1)^4}dz$; where $c:\|z\|=4$ (ii) $\oint_c \frac{e^z}{(z+1)^4(z-2)}dz$; where $c:\|z-1\|=3$
Q.35	Attempt the following. If $A=\begin{bmatrix}1 & 2 & -2\\ -1 & 3 & 0\\ 0 & -2 & 1\end{bmatrix}$ find A^3 and A^{-1} using Cayley Hamilton Theorem.

Each question is of equal Marks (10 Marks)

	Show that the matrix $\frac{1}{\sqrt{3}}\begin{bmatrix} 1 & 1+i \\ 1-i & -1 \end{bmatrix}$ is unitary.
Q.36	Attempt the following. Using Cayley-Hamilton theorem, find the inverse of $\begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$. If A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I = 0$, Where I is a unit matrix of second order.
Q.37	Attempt the following. Define Hermitian matrix. If $A = \begin{bmatrix} 2+i & 3 & -1+3i \\ -5 & i & 4-2i \end{bmatrix}$ show that AA^* is a Hermitian matrix. Using Gauss –Jordan Method , find the inverse of $\begin{bmatrix} 2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.
Q.38	Find the eigenvalues & eigenvectors of the following matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.
Q.39	Find the eigenvalues & eigenvectors of the following matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

Each question is of equal Marks (10 Marks)

Q.40	Attempt the following. Find A^{-1} by Gauss Jordan Method, where $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$. Find characteristic equation ,eigen value and eigen vectors of matrix A ifA= $\begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$.
Q.41	If $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ find A^{-1} using Cayley Hamilton Theorem.
Q.42	If $A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & -2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ find A^{-1} using Cayley Hamilton Theorem.
Q.43	Verify cayley-Hamilton theorem for the matrix A, where $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$
Q.44	Verify cayley-Hamilton theorem for the matrix A, where $A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$
Q.45	Verify cayley-Hamilton theorem for the matrix A, where $A = \begin{bmatrix} 3 & 2 & 4 \\ 4 & 3 & 2 \\ 2 & 4 & 3 \end{bmatrix}$

Each question is of equal Marks (10 Marks)

Q.46	Find the eigen values and eigen vectors of the matrix $A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$
Q.47	Find the eigen values and eigen vectors of the matrix $A=\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$
Q.48	Attempt the following. Prove that the matrix $A=\begin{bmatrix} \frac{1}{2}(1+i) & \frac{1}{2}(-1+i) \\ \frac{1}{2}(1+i) & \frac{1}{2}(1-i) \end{bmatrix}$ ia unitary and find A^{-1}. Show that $A=\begin{bmatrix} 3 & 7-4i & -2+5i \\ 7+4i & -2 & 3+i \\ -2-5i & 3-i & 4 \end{bmatrix}$ is a Hermitian matrix.
Q.49	Attempt the following. Show that the matrix $A=\begin{bmatrix} \alpha+i\gamma & -\beta+i\delta \\ \beta+i\delta & \alpha-i\gamma \end{bmatrix}$ is unitary matrix, if $\alpha^2+\beta^2+\gamma^2+\delta^2=1$. Show that every square matrix can be uniquely expressed as $P+iQ$, where P and Q are Hermitian matrices.
Q.50	Evaluate the line integral $\int_C \left[(y+3z)dx+(2z+x)dy+(3x+2y)dz\right]$ where C is the square formed by the lines $y=\pm 1$ *and* $x=\pm 1$.

GUJARAT UNIVERSITY

B.E. SEM – 4 (EC IC BM)

Question Bank

Maths – II

Each question is of equal Marks (10 Marks)

Q.51	Evaluate the line integral $\int_C \left[(x^2+xy)dx+(x^2+y^2)dy\right]$ where C is the square formed by the lines $y=\pm 1$ *and* $x=\pm 1$.
Q.52	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.53	Using Green's Theorem, evaluate $\int_C (x^2y dx+x^2dy)$, where C is the boundary described counter clockwise of the triangle with vertices (0, 0) (1, 0) & (1, 1).
Q.54	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.55	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.56	Verify Gauss Divergence theorem for $\vec{F}=\left(x^2-yz\right)\hat{i}+(y^2-zx)\hat{j}+(z^2-xy)\hat{k}$ taken over the rectangular parallopied $0\le x\le a, 0\le y\le b, 0\le z\le c.$
Q.57	Evaluate $\iint_S (\nabla\times\overline{F}).d\overline{S}$ 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 $\oint_c \overline{F}.d\bar{r}$ 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)

GUJARAT UNIVERSITY
B.E. SEM – 4 (EC IC BM)
Question Bank
Maths – II

Each question is of equal Marks (10 Marks)

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 $\int_C [(x^2+xy)dx+(x^2+y^2)dy]$ 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 $\int_C (x^2ydx+x^2dy)$, 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	Verify Gauss Divergence theorem for $\vec{F}=\left(x^2-yz\right)\hat{i}+(y^2-zx)\hat{j}+(z^2-xy)\hat{k}$ taken over the rectangular parallopied $0\le x\le a, 0\le y\le b, 0\le z\le c.$
Q.67	Evaluate $\iint_S (\nabla\times\overline{F}).d\overline{S}$ 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 $\oint_c \overline{F}.d\overline{r}$ 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 $\oint_C (xydx+xy^2dy)$ by Stoke's theorem taking C to be a square in the xy-

Each question is of equal Marks (10 Marks)

	plane with 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). (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 $(\phi\vec{A}) = \phi(div\vec{A}) + (grad\phi).\vec{A}$. (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 $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$. (b) For a constant vector $\bar{a}$, show that $\nabla \times \left(\frac{\bar{a} \times \bar{r}}{r^3}\right) = -\frac{\bar{a}}{r^3} + \frac{3(\bar{a}\,.\,\bar{r})}{r^5}\bar{r}$,where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$.
Q.73	(a) Prove that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$, where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$.

Each question is of equal Marks (10 Marks)

	(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 $\vec{F} = \nabla\phi$
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 $\vec{F} = \nabla\phi$
Q.77	Attempt the following. 1) Express the function $f(x) = \begin{cases} 1; \lvert x\rvert < 1 \\ 0; \lvert x\rvert > 1 \end{cases}$ as a Fourier integral. Hence evaluate $\int_0^\infty \frac{\sin\lambda\cos\lambda x}{\lambda} d\lambda$. 2) Find the Fourier sine transform of $e^{-\lvert x\rvert}$. Hence show that $\int_0^\infty \frac{x\sin mx}{i + x^2} dx = \frac{\pi e^{-m}}{2}$; m> 0.
Q.78	Attempt the following. 1) Find the Fourier Transform of $f(x) = \begin{cases} 1; \lvert x\rvert < 1 \\ 0; \lvert x\rvert > 1 \end{cases}$. Hence evaluate $\int_0^\infty \frac{\text{sinx}}{x} dx$. 2) Find the Fourier integral represent for $f(x) = \begin{cases} 1 - x^2; \lvert x\rvert \le 1 \\ 0; \quad \lvert x\rvert > 1 \end{cases}$.
Q.79	Attempt the following. 1) Find the Fourier integral represent for $f(x) = \begin{cases} e^{ax}; \text{for } x \le 0, a > 0 \\ e^{-ax}; \text{ for } x \ge 0, a < 0 \end{cases}$. 2) Find the Fourier cosine transform of $f(x) = \begin{cases} 1; 0 \le x < 2 \\ 0; \quad x \ge 2 \end{cases}$

GUJARAT UNIVERSITY

B.E. SEM – 4 (EC IC BM)

Question Bank

Maths – II

Each question is of equal Marks (10 Marks)

Q.80	Attempt the following. 1) Using Fourier sine transform of $e^{-ax} (a > 0)$, show that $\int_0^\infty \frac{x \sin kx}{a^2 + x^2} dx = \frac{\pi e^{-ak}}{2} (k > 0)$. 2) Using Fourier Integral show that $\int_0^\infty \frac{\omega \sin x\omega}{1+\omega^2} d\omega = \frac{\pi e^{-x}}{2} (x > 0)$.
Q.81	Attempt the following. 1) Find the Fourier sine and cosine transform of $x^{n-1} (n > 0)$. 2) Using Fourier integral representation, show that $\int_0^\infty \frac{\sin \omega \cos \omega x}{\omega} d\omega = \frac{\pi}{2} (0 \le x < 1)$.
Q.82	Solve by Cardan'smethod $x^3 - 3x^2 + 12x + 16 = 0$. Solve the equation $x^4 - 12x^3 + 41x^2 - 18x - 72 = 0$ by Ferrari's method.
Q.83	Solve by Cardan'smethod $28x^3 - 9x^2 + 1 = 0$. Solve the equation $x^4 - 2x^3 - 5x^2 + 10x - 3 = 0$ by Ferrari's method.
Q.84	Solve by Cardan'smethod $x^3 - 27x + 54 = 0$. Solve the equation $x^4 + 2x^3 - 7x^2 - 8x + 12 = 0$ by Ferrari's method.
Q.85	Solve by Cardan'smethod $x^3 - 18x + 35 = 0$. Solve the equation $x^4 - 10x^2 - 20x - 16 = 0$ by Ferrari's method.
Q.86	Solve by Cardan'smethod $2x^3 - 5x^2 + x - 2 = 0$. Solve the equation $x^4 - 8x^3 - 12x^2 + 60x + 63 = 0$ by Ferrari's method.