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QUESTION BANK

Title of the Subject: Engineering Mathematics-III	
Title of the Unit: Laplace Transform	Unit No:- I

Multiple Choice Questions		
Question No.	Question Description	Expected Marks
1	If f(t) = t^n where, 'n' is an integer greater than zero, then its Laplace Transform is given by a) n! b) t^{n+1} c) $n!/s^{n+1}$ d) Does not exist	1
2	Laplace transform of $t^m e^{bt}$ is A] $\frac{\sqrt{m}}{(s+b)^m}$ B] $\frac{\sqrt{(m+1)}}{(s-b)^{m+1}}$ C] $\frac{(m+1)!}{(s+b)^{m+1}}$ D] $\frac{m!}{(s-b)^m}$	1
3	L {te^{-t}Cos 2t} is equal to A] $\frac{s^2+2s+5}{(s^2+2s-3)^2}$ B] $\frac{s^2-2s+5}{(s^2+2s-3)^2}$ C] $\frac{s^2+2s-5}{(s^2+2s-3)^2}$ D] None of these	1
4	Laplace transform of $[t.u(t-2)]$ is A] $\frac{1}{s^2}e^{-2s}$ B] $\left(\frac{1}{s^2}-\frac{2}{s}\right)e^{-2s}$ C] $\left(\frac{1}{s^2}+\frac{2}{s}\right)e^{-2s}$ D] $\frac{2e^{-2s}}{s}$	1
5	Laplace transform of $\iiint_0^t cosau\, du\, du\, du$ is given as A] $\frac{1}{s^2(s^2+a^2)}$] B] $\frac{1}{s(s^2 2+a^2)}$ C] $\frac{1}{s^2(s+a)}$ D] None of these	1
6	Laplace transform of t sin t is A] $\frac{2s}{(s^2+1)^2}$ B] $\frac{s}{(s^2+1)^2}$ C] $\frac{2s}{(s^2-1)^2}$ D] None of these	1
7	L $\{\delta(t)\}$ is equal to	1

	A] 0 B] ∞ C] e^{-as} D] 1	
8	L $\{4^t\}$ is equal to A] $\frac{1}{s-\log 4}$ B] $\frac{1}{s+\log 4}$ C] $\frac{1}{s \log 4}$ D] None of these	**1**
9	Laplace transform of sin 2t $\delta(t-2)$ is A] $e^{2s}\sin 4$ B] $e^{-2s}\sin 2$ C] $e^{-4s}\sin 2$ D] None of these	**1**
10	Laplace transform of te^{at} sin at is A] $\frac{s-a}{(s-a)^2+a^2}$ B] $\frac{2s(s-a)}{[(s-a)^2+a^2]^2}$ C] $\frac{2a}{(s-a)^2+a^2}$ D] $\frac{2a(s-a)}{[(s-a)^2+a^2]^2}$	**1**

Short Answer Question

Question No.	**Question Description**	**Expected Marks**
1	Find $L\left[\frac{1-\cos t}{t}\right]$	**2**
2	Find $L\left[\frac{\cos at-\cos bt}{t}\right]$	**2**
3	Find $L\left[\frac{\sin^2 2t}{t^2}\right]$	**2**
4	Find $L\left[\frac{1-e^{-t}}{t}\right]$	**2**
5	If $L[\mathrm{erf}(\sqrt{t})] = \frac{1}{s\sqrt{s+1}}$ $Then\ Find\ (i)\ L[\mathrm{erf}(2\sqrt{t})](ii)\ L[t.\mathrm{erf}(2\sqrt{t})]$	**2**
6	Find $L\left[\frac{d}{dt}\left(\frac{\sin t}{t}\right)\right]$	**2**
7	Find $L\left[\frac{d}{dt}\left(e^{-5t}\sin t\right)\right]$	**2**
8	Find $L\left[e^{-t}.\int_0^t\left(\frac{\sin t}{t}\right)dt\right]$	**2**
9	Find $L\left[\int_0^t t^3 e^{-4t}\,dt\right]$	**2**
10	Find $L\left[\int_0^t te^{-4t}\sin 3t\,dt\right]$	**2**

Long Answer Question

Question No.	Question Description	Expected Marks
1	Evaluate $\int_0^\infty \frac{e^{-t}(1-cos2t)}{2t}dt$	5
2	Evaluate $\int_0^\infty e^{-t}\int_0^t \left(\frac{siny}{y}\right)dy.dt$	5
3	Evaluate $\int_0^\infty \left(\frac{e^{-t}-e^{-3t}}{t}\right)dt$	5
4	Find L.T. of $f(t) = t$, $0 \ll t << C$ Where F(t) is periodic with $= 2C - t$, $C \ll t < 2C$ period 2C.	5
5	Find Laplace Transform of $f(t) = \lvert sinpt \rvert$	5
6	Find L.T. of $f(t) = sin\left(\frac{\pi t}{a}\right)$, $0 < t < T$ Where F(t) is periodic & period T.	5
7	Evaluate $\int_0^\infty e^{-t}\int_0^t \left(\frac{siny}{y}\right)dy.dt$	5
8	Evaluate $\int_0^\infty \left(\frac{e^{-t}-e^{-3t}}{t}\right)dt$	5
9	Express $f(t)$ in term of Heaviside unit step Heaviside, & Find Laplace transform. 1] $f(t) = sint$, $0 < t < \pi$ $= sin2t$, $0 < t < \pi$ $= sin3t$, $t > 2\pi$	5
10	Express $f(t)$ in term of Heaviside unit step Heaviside , & Find Laplace transform. $f(t) = e^t cost$, $0 < t < \pi$ $= e^t sint$, $t > \pi$	5

QUESTION BANK

Title of the Subject: Engineering Mathematics-III	
Title of the Unit: Inverse Laplace Transform	**Unit No:- II**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	$L^{-1}\left\{\frac{1}{(s+a)^2}\right\}$ is equal to A] t e^{-at} B] t e^{at} C] –t e^{-at} D] –t e^{at}	**1**
2	$L^{-1}\left\{\frac{1}{s(s^2+1)}\right\}$ is equal to A] 1 + Cos t B] 2 - Cos t C] 1 – Cos t D] 1 – sin t	**1**
3	Inverse Laplace transform of 1 is A] $\delta(t)$ B] u(t) C] $\delta(t-1)$ D] u$(t-1)$	**1**
4	The Inverse Laplace transform of log $\left(\frac{s+1}{s-1}\right)$ is given by A] $\frac{2}{t}\ cosht$ B] $\frac{2}{t} sinht$ C] 2 t Cost D] 2 t sin t	**1**
5	The inverse Laplace transform of $\frac{1}{(s+2)^2}$ is equal to A] t e^{-2t} B] t e^{-t} C] e^{-2t} D] None of these	**1**
6	Inverse Laplace transform of $\frac{1}{s^2+4s+13}$ is equal to A] $\frac{1}{3}\,e^{-2t}$ sin 3t B] $\frac{1}{3}\,e^{2t}$ sin 3t C] e^{-2t} sin 3t D] None of these	**1**

7	$L^{-1}\left\{\frac{1}{(s+3)^5}\right\}$ is equal to A] $\frac{e^{-3t}t^4}{24}$ B] $\frac{e^{3t}t^4}{24}$ C] $e^{-3t}t^4$ D] None of these	**1**
8	$L^{-1}\left\{\frac{1}{s^n}\right\}$ is possible only when n is A] Zero B] –ve integer C] +ve integer D] None of these	**1**
9	$L^{-1}\left\{\frac{1}{\sqrt{s+3}}\right\}$ is equal to A] $\frac{e^{-3t}}{\sqrt{\pi t}}$ B] $\frac{e^{3t}}{\sqrt{\pi t}}$ C] $\frac{e^{-3t}}{\pi t}$ D] None of these	**1**
10	$L^{-1}\{e^{-as}\bar{f}(s)\}$ is equal to A] f(t) u(t) B] f$(t-a)$ u(t) C] f$(t-a)$ u$(t-a)$ D] None of these	**1**

Short Answer Question

Question No.	Question Description	Expected Marks
1	Using first shifting theorem find $L^{-1}\left\{\frac{1}{(s+5)^2}\right\}$.	**2**
2	Find inverse Laplace transform of $\frac{s}{2s^2-1}$.	**2**
3	Find inverse Laplace transform of $\frac{s}{s^2+1}$.	**2**
4	Find $L^{-1}\left\{\frac{1}{s(s+1)}\right\}$	**2**
5	Find the inverse Laplace transform of $\frac{1}{s^2+4s+10}$	**2**
6	Find $L^{-1}\left\{\frac{1}{s(s-1)}\right\}$	**2**
7	By convolution theorem $L^{-1}\{f(s).g(s)\}$=……………	**2**
8	Find Inverse Laplace transform of $\frac{1}{(s+2)(s-1)}$	**2**
9	Solve $\frac{dy}{dx}+y=0$, $y(0)=1$	**2**
10	Solve $\frac{dy}{dt}+3y=t$, $y(0)=2$	**2**

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Find$L^{-1}\left\{log\frac{s(s+1)}{s^2+4}\right\}$	**5**
2	solve the equation by transform method; $\frac{dy}{dt}+2y+\int_0^1 y\,dt=sint$ Where $y(0)=0\,,y'(0)=1$	**5**
3	Find$L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$	**5**
4	Using convolution theorem find$L^{-1}\left\{\frac{s^2}{(s^2+4)^2}\right\}$.	**5**
5	Find the inverse Laplace transform of $\frac{s^3+6s^2+14s}{(s+2)^4}$	**5**
6	Find the inverse Laplace transform of $\frac{s+1}{s(s^2+2s+2)}$	**5**
7	Solve the following differential equation by Laplace transform method $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+y=e^x$, under condition $y=2\ and\ \frac{dy}{dx}=-1$ at $x=0$	**5**
8	Solve $\frac{d^2y}{dx^2}+y=3cos2x$ given that, $y(0)=0,y'(0)=-2$.	**5**
9	Solve the linear differential equation by Laplace transform $(D^2+4D+13)y=2\delta(t)$ Given that,$t=0,x=2\,,\frac{dx}{dt}=0$	**5**
10	Solve $\frac{dx}{dt}+y=sint\,,\frac{dy}{dt}+x=cost$ where $x(0)=0,y(0)=2$	**5**

QUESTION BANK

Title of the Subject: Engineering Mathematics-III	
Title of the Unit: Fourier Transform	**Unit No:- III**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	The Fourier cosine transform of the function f(t) is A] $F\text{c}\,(s) = \int_0^{\infty} f(t) \cos st\, dt$ B] $F\text{c}\,(s) = \int_0^{\infty} f(t) \cos t\, dt$ C] $F\text{c}\,(s) = \int_0^{\infty} f(st) \cos t\, dt$ D] None of these	**1**
2	The Fourier Cosine transform of $\frac{1}{x}$ is A] $\frac{s^2}{2}$ B] $\frac{s^2}{3}$ C] $\frac{s}{2}$ D] None of these	**1**
3	The Fourier transform of $f(x)$ is $f(s)$, then the inversion formula is A] $f(x) = \frac{1}{\pi} \int_{-\infty}^{\infty} f(s)\, e^{-isx}$ ds B] $f(x) = \frac{1}{2\pi} \int_{-\infty}^{\infty} f(s)\, e^{-isx}$ ds C] $f(x) = \frac{1}{2\pi} \int_{0}^{\infty} f(s)\, e^{-isx}$ ds D] None of these	**1**
4	If F $[f(x)] = (s)$, then F $[f(x-a)]$ is equal to A] $e^{isa}\, f(s)$ B] $e^{-isa}\, f(s)$ C] $e^{ist}\, f(s)$ D] None of these	**1**
5	If Fc $\{f(ax)\}$ = K Fc$\left(\frac{s}{a}\right)$, then K is equal to	**1**

	A] $\frac{2}{a}$ B] $\frac{1}{a}$ C] a D] None of these	
6	Fourier transform of the second derivative of $u(x,t)$ is equal to A] $s^2 f(u)$ B]$- s^2 f(u)$ C] $s\, f(u)$ D] None of these	1
7	Fourier transform is a linear combination, is A] True B] False C] None of these	1
8	The kernel of Fourier transform is e^{sx} , is A] True B] False C] None of these	1
9	The finite Fourier cosine transform of $f(x) = 1$ in $(0,\pi)$ is zero, is A] True B] False C] None of these	1
10	The Fourier Cosine transform of e^{-x} is A] $\frac{s}{s^2+1}$ B] $\frac{s}{s^2-1}$ C] $\frac{1}{s^2+1}$ D] None of these	1

Short Answer Question

Question No.	**Question Description**	**Expected Marks**
1	Using Fourier integral representations, Show that, $\int_0^{\infty} \frac{\omega \sin x\omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \quad (x > 0)$	2
2	Using Fourier integral representations, Show that, $\int_0^{\infty} \frac{\cos x\omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \quad (x \geq 0)$	2
3	Find Fourier transform of $f(x) = \begin{cases} 1, & for\ \lvert x\rvert < 1 \\ 0, & for\ \lvert x\rvert > 1 \end{cases}$. Hence evaluate that $\int_0^{\infty} \frac{Sinx}{x} dx.$	2
4	Find the Fourier Cosine transform of e^{-x^2}	2
5	Find the Fourier sine transform of $\frac{e^{-ax}}{x}$	2
6	Find the Fourier sine transform of $e^{-\lvert x\rvert}$, and hence show that $\int_0^{\infty} \frac{x Sinmx}{1+x^2} dx = \frac{\pi}{2} e^{-m} \quad (m > 0)$	2
7	Find the Fourier cosine and Sine transform of $f(x) = 2x, \quad 0 < x < 4.$	2
8	Find Fourier transform of $e^{-2(x-3)^2}$	2

9	Using Parseval's identity, prove that $\int_0^{\infty} \frac{t^2}{(t^2+1)^2} dt = \frac{\pi}{4}$.	2
10	Using Parseval's identity, prove that $\int_0^{\infty} \frac{Sinat}{t(t^2+a^2)^2} dt = \frac{\pi}{2}\left(\frac{1-e^{-a^2}}{a^2}\right)$.	2

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Find the finite Fourier Cosine & Sine transform of $f(x) = \begin{matrix} -x\ , & for\ x < c \\ \pi - x & for\ x > c \end{matrix}.where\ 0 \le c \le \pi.$	5
2	Using Parseval's identity, prove that $\int_0^{\infty} \frac{t^2}{(4+t^2)(9+t^2)} dt = \frac{\pi}{10}$.	5
3	Find the Fourier transform of $f(x) = \begin{matrix} 1-x^2, & for\ \lvert x\rvert \le 1 \\ 0, & for\ \lvert x\rvert > 1 \end{matrix}$. Hence evaluate that $\int_0^{\infty} \left(\frac{xCosx - Sinx}{x^3}\right) Cos\frac{x}{2} dx.$	5
4	Using Fourier integral representations, Show that, $\int_0^{\infty} \frac{Sin\omega Cosx\omega}{\omega} d\omega = \frac{\pi}{2}\ \ (0 \le x < 1)$	5
5	Evaluate the integral $\int_0^{\infty} \left(\frac{1-Cosx}{x}\right)^2 dx.$	5
6	Find Fourier transform of $f(x) = \begin{matrix} a - \lvert x\rvert\ , & \lvert x\rvert < a \\ 0, & \lvert x\rvert > a > 0 \end{matrix}$. Also Show that $\int_0^{\infty} \frac{sin^2 t}{t^2} dt = \frac{\pi}{2}$.	5
7	Find the Fourier Cosine transform of $e^{\frac{-x^2}{2}}$	5
8	Find the Fourier transform of $f(x) = \begin{matrix} a^2 - x^2, & for\ \lvert x\rvert < a \\ 0, & for\ \lvert x\rvert > a > 0 \end{matrix}$. Hence evaluate that $\int_0^{\infty} \left(\frac{Sinx - xCosx}{x^3}\right) dx = \frac{\pi}{4}.$	5
9	Find the Fourier Cosine and Sine transform of $f(x) = e^{-ax}\ ,\ a > 0.$	5
10	Find the Fourier Sine transform of $f(x) = \begin{matrix} x\ , & 0 < x < 1 \\ 2 - x\ , & 1 < x < 2. \\ 0\ , & x > 2 \end{matrix}$	5

QUESTION BANK

Title of the Subject: Engineering Mathematics-III	
Title of the Unit: Partial Differential Equation & its Application	**Unit No:- IV**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	The solution of the partial differential equation r – t = 0 is A] $z = f\ (x^2 + y^2)$ B] $z = f1\ (y + x) + f2\ (y - x)$ C] $z = f1\ (y + x) + f2\ (y - 2x)$ D] None	**1**
2	The solution of $\frac{\partial^4 z}{\partial x^4}$ is A] $z = f1(y) + xf2(y) + x^2f3(y) + x^3f4(y)$ B] $z = f1(x) + yf2(x) + y^2f3(y) + y^3f4(y)$ C] $z = f1(x) - yf2(x) + y^2f3(y) + y^3f4(y)$ D] None of these	**1**
3	Particular integral of $(D^2 - D'^2)\,z = \cos(x + y)$ is A] $\frac{x}{2}\text{Cos}(x + y)$ B] $x\sin(x + y)$ C] $\frac{x}{2}\text{Sin}(x + y)$ D] None of these	**1**
4	The equation $\frac{\partial^2 z}{\partial x^2}$ - $\frac{\partial^2 z}{\partial y^2}$ =0 is A] Parabolic B] Elliptic C] Hyperbolic D] None of these	**1**
5	The solution of $(D^2 - DD')$ Z = 0 is A] $z = f1(x) + f2(y - x)$ B] $z = f1(y) + f2(y - x)$ C] $z = f1(y) + f2(x)$	**1**

	D] None	
6	The solution of $xp + yp = z$ is A] $f(x,y) = 0$ B] $f\left(\frac{x}{y},\frac{y}{z}\right) = 0$ C] $f(xy,yz) = 0$ D] None	1
7	The solution of $\frac{\partial^3 z}{\partial x^3}$ is A] $z = f1(y) + xf2(y) + x^2 f3(y)$ B] $z = (1 + x + x^2)f(y)$ C] $z = f1(x) + xf2(x) + y^2 f3(x)$ D] $z = (1 + y + y^2)f(x)$	1
8	The complementary function of $(D^2 - 4DD' + 4D'^2)z = (x + y)$ is A] $z = f1(y + 2x) + xf2(y + 2x)$ B] $z = f1(y + x) + xf2(y + x)$ C] $z = f1(x + 2y) + xf2(x + 2y)$ D] None	1
9	The particular integral of $(D^2 + DD')z = Sin(x + y)$ is A] $-\frac{1}{2}\sin(x + y)$ B] $\frac{1}{2}\sin(x + y)$ C] $\frac{1}{2}\text{Cos}(x + y)$ D] None	1
10	The particular integral of $(D^2 - D'^2)z = Cos(x + y)$ is A] $x\,\text{Cos}(x + y)$ B] $\frac{x}{2}\text{Cos}(x + y)$ C] $\frac{x}{2}\text{Sin}(x + y)$ D] None	1

Short Answer Question

Question No.	Question Description	Expected Marks
1	Form the partial differential equations by eliminating the arbitrary constants: $(i)\ z = ax + by + ab$ $(ii)\ z = ax + a^2y^2 + b$ $(iii)\ z = (x^2 + a)(y^2 + b)$	2
2	Form the partial differential equations by eliminating the arbitrary functions: $(i)\ z = f(x + it) + g(x - it)$ $(ii)\ z = f(x^2 - y^2)$ $(iii)\ z = x + y + f(xy)$	2
3	Solve $\frac{\partial^2 z}{\partial y^2} = Sin(xy)$	2
4	Solve $\frac{\partial^2 z}{\partial x^2} + z = 0,\ given\ that\ when\ x = 0, z = e^y\ and\ \frac{\partial y}{\partial x} = 1.$	2
5	Solve $p - q = 1$	2

6	Solve $x^2p^2 + y^2q^2 = z^2$	**2**
7	Solve $z = px + qy + \sqrt{(1 + p^2 + q^2)}$	**2**
8	Solve $r = a^2t$, Where the symbols have got their usual meaning	**2**
9	Classify the partial differential equation $2\frac{\partial^2 z}{\partial x^2} + 4\frac{\partial^2 z}{\partial x \partial y} + 3\frac{\partial^2 z}{\partial y^2} = 0.$	**2**
10	Classify the partial differential equation $x^2\frac{\partial^2 u}{\partial t^2} + 3\frac{\partial^2 u}{\partial x \partial t} + x\frac{\partial^2 u}{\partial x^2} + 17\frac{\partial u}{\partial t} = 100u.$	**2**

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Solve the following partial differential equations $(i)\ pz - qz = z^2 + (x+y)^2$ $(ii)\ \frac{y^2 z}{x}p + xzq = y^2$ $(iii)\ (x^2 - yz)p + (y^2 - zx)q = z^2 - xy$	**5**
2	Solve $s + p - q = z + xy$	**5**
3	Solve $(D - 3D' - 2)^3 z = 6e^{2x}\sin(3x + y)$	**5**
4	Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y\cos x.$	**5**
5	Solve the linear partial differential equation $(D - D' - 1)(D - D' - 2)z = e^{3x-y} + x$	**5**
6	Use the method of separation of variables to solve the equation $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ given that $u(x, 0) = 4e^{-x}$	**5**
7	Use the method of separation of variables to solve the equation $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ given that $u(x, 0) = 6e^{-3x}$	**5**
8	A string is stretched and fastened to two points ***l*** apart. Motion is started by replacing the string in The form $y = A\sin\left(\frac{\pi x}{l}\right)$ from which it is released at time t=0 . Show that the displacement of a Point at a distance 'x' from one end at time 't' is given by $y(x,t) = A\sin\left(\frac{\pi x}{l}\right)\cos\left(\frac{\pi ct}{l}\right).$	**5**

9	If the initial displacement and velocity of a string stretched between $x = 0$ & $x = l\ are\ given\ by\ y = f(x),$ determine the displacement 'y' of any point at a distance 'x' from one end at time 't'.	**5**
10	Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with boundary conditions $u(x, 0) = 3sinn\pi x, u(0, t) = 0$ $u(l, t) = 0, where\ 0 < x < l.$	**5**

QUESTION BANK

Title of the Subject: Engineering Mathematics-III	
Title of the Unit: Function Of Complex Variable (Differential Calculus)	**Unit No:- V**

Multiple Choice Questions

Question No.	**Question Description**	**Expected Marks**
1	Which out of the following is an analytic function? A] $f(z) = sinz$ $B]$ $f(z) = z$ C] $f(z) = Im(z)$ D] $R(iz)$	**1**
2	If $f(z) = u + iv$ is an analytic function , then $f'(z)$ is equal to A] $\frac{\partial u}{\partial x} - \text{i}\frac{\partial v}{\partial x}$ B] $\frac{\partial u}{\partial x} + \text{i}\frac{\partial v}{\partial x}$ C] $\frac{\partial u}{\partial x} - \text{i}\frac{\partial v}{\partial y}$ D] None	**1**
3	If the function $2x + x^2 + \alpha y^2$ is to be harmonic, then the value of α will be A] -1 B] 1 C] 2 D] None	**1**
4	The analytic function mapping the angular region $0 \leq 6 \leq \frac{\pi}{4}$ onto the upper half plane is A] z^2 B] $4z$ C] z^4 D] None	**1**
5	The mapping $w = z^2 - 2z - 3$ is A] Conformal within $\|z\| = 1$ B] Not Conformal with $z = 1$ C] Not Conformal at z = -1 and z = 3 D] None	**1**
6	The fixed point of the mapping $w = \frac{3z+4}{z+5}$ are A] 2, 2 B] 2,-2 C] -2,-2 D None	**1**

7	The value of $\int \frac{3z^2+5z+2}{z-1}\,dz$, where C is $\lvert z \rvert = \frac{1}{2}$, is A] 0 B] $2\pi i$ C] πi D] None	**1**
8	Which out of the following is an analytic function? A] $f(z) = sinz$ $B]$ $f(z) = z$ C] $f(z) = Im(z)$ D] $R(iz)$	**1**
9	If $f(z) = u + iv$ is an analytic function , then $f'(z)$ is equal to A] $\frac{\partial u}{\partial x} - \mathrm{i}\frac{\partial v}{\partial x}$ B] $\frac{\partial u}{\partial x} + \mathrm{i}\frac{\partial v}{\partial x}$ C] $\frac{\partial u}{\partial x} - \mathrm{i}\frac{\partial v}{\partial y}$ D] None	**1**
10	If the function $2x + x^2 + \alpha y^2$ is to be harmonic, then the value of α will be A] -1 B] 1 C] 2 D] None	**1**
	Short Answer Question	
Question No.	The mapping $w = z^2 - 2z - 3$ is A] Conformal within $\lvert z \rvert = 1$ B] Not Conformal with $z = 1$ C] Not Conformal at z = -1 and z = 3 D] None	**Expected Marks**
1	The fixed point of the mapping $w = \frac{3z+4}{z+5}$ are A] 2, 2 B] 2,-2 C] -2,-2 D None	**2**
2	The value of $\int \frac{3z^2+5z+2}{z-1}\,dz$, where C is $\lvert z \rvert = \frac{1}{2}$, is A] 0 B] $2\pi i$ C] πi D] None	**2**
3	Find the image of $\lvert z - 2i \rvert = 2$, under the transformation $w = \frac{1}{z}$	**2**
4	If $u = e^{ax} cosy$ is harmonic, then find a.	**2**
5	CR equations in polar form are……………………..	**2**
6	Find the image of the line $y = 0$ under the transformation $w = \frac{1}{z}$.	**2**
7	If $u = cosax.sinhy$ is harmonic, then find a	**2**
8	Show that $u = y^2 - x^2$ is harmonic function.	**2**

The ar

plane

A] z^2

9	Find the Taylors' series for $f(z) = e^z$ about $z = 2$.	**2**
10	A mapping $w = f(z)$ is said to be conformal if..................	**2**

Long Answer Question		
Question No.	**Question Description**	**Expected Marks**
1	Determine $\mathrm{f(z)} = \frac{\mathrm{z}}{\mathrm{\|z\|}}$ is analytic or not?	**5**
2	Find an analytic function f (z) such that: Re [f' (z)] =3x2-4y-3y2 & f(1+i)=0.	**5**
3	Find analytic function f (z) for each of the following where f (z) =u+iv. If $v(r,\theta) = (r - \frac{1}{r})\ \sin\theta,$ r≠0	**5**
4	Find analytic function f (z) for each of the following where f (z) =u+iv. $2u + v = e^{x}\cdot(cosy - siny)$	**5**
5	Prove that function is harmonic function & find its harmonic conjugate & also corresponding analytic function f (z). u(r,θ) =r^2 cos2θ.	**5**
6	Prove that function is harmonic function & find its harmonic conjugate & also corresponding analytic function f (z). $u = log\sqrt{x^2 + y^2}$.	**5**
7	Find the image of the square with vertices:(0,0),(2,0),(2,2) and (0,2) under the transformation $w = (1 + i).z + (2 + i)$	**5**
8	Find the image of the lines : i) $x = y + 1$ ii) the line joining the points $A(1 + i) to\ B(2 + 3i)$ in Z-plane under the transformation $w = \frac{i}{z}$	**5**
9	Find the image of the circle $\|z - 3i\| = 3$ under the transformation $w = \frac{1}{z}$	**5**
10	Expand $f(z) = \frac{7z-2}{z(z+1)(z-2)}$ for 1 <$\|z + 1\| < 3$	**5**

QUESTION BANK

Title of the Subject: Engineering Mathematics-III	
Title of the Unit: Function Of Complex Variable (Integral Calculus)	**Unit No:- VI**

Multiple Choice Questions		
Question No.	**Question Description**	**Expected Marks**
1	Residue of $f(z) = \frac{cosz}{2}$ is A] 0 B] 1 C] 2 D] None	**1**
2	The critical point of the transformation $w = (z - a)(z - b)$ is A] $\frac{a-b}{2}$ B] $\frac{b-a}{2}$ C] $\frac{a+b}{2}$ D] None	**1**
3	The image of $\lvert z + 1\rvert = 1$ under the mapping $w = \frac{1}{z}$ is A] $2u - 1 = 0$ B] $2u + 1 = 0$ C] $2v + 1 = 0$ D] None	**1**
4	The function $w = logz$ is analytic everywhere except at A] z = 0 B] z = 1 C] z = 2 D] None	**1**
5	The singularity of $f(z) = \frac{z}{(z-2)^2}$ is A] Z = 3 B] Z = C] Z = 0 D] None	**1**
6	The of the function $f(z) = \frac{z^2}{(z-2)^2(z+3)}$ are A] $z = 2, -3$ B] $z = 2,3$ C] $z = -2, -3$ D] None	**1**
7	The transformation $w = cz$ consists of	**1**

	A] magnification and rotation B] Translation C] Inversion D] None	
8	The invariant point of $w = \frac{1+z}{1-z}$ are A] $z = \pm i$ B] $z = \pm 1$ C] $z = 0$ D] None	1
9	The singular point of $\frac{\cos\pi z}{(z-1)(z-2)}$ are A] 0, 1 B] 1, 2 C] -1, -2 D] None	1
10	The pole of $\frac{(z-1)^2}{z(z-2)}$ are at A] $z = 1,2$ B] $z = 0,-2$ C] $z = 0,2$ D] None	1

Short Answer Question

Question No.	Question Description	Expected Marks
1	Evaluate by using Cauchy's integral theorem $\oint \frac{3z^2+2}{z-1} dz$	2
2	Evaluate $\int_0^{1+i} z^2 . dz$ along a line $y = x$.	2
3	Evaluate $\oint |z|^2 dz$ where C is upper half of the circle: $|z| = 2$	2
4	If c is $|z| = 1$ then evaluate $\int \frac{e^{-z}}{z^2} dz$	2
5	Evaluate $\oint \frac{e^z}{(z-1)(z-4)} dz$ where C $|z| = 2$:	2
6	Find the sum of residues of $f(z) = \frac{\sin z}{z\cos z}$ at its poles inside the circle $|z| = 2$.	2
7	Find the residue of $f(z) = \frac{1}{z(z-i)}$ at z= i.	2
8	Find the residue at each point of $\frac{1}{z^2+4}$	2
9	Determine the poles and also find the order of each pole for $f(z) = \frac{z}{(z-a)^2(z-b)}$	2
10	Find the residues at each pole of following. a) $f(z) = \frac{1}{(z+1)^2}$ b) $f(z) = \frac{4z}{z(z-1)^2}$)	2

Long Answer Question

Question No.	Question Description	Expected Marks

1	Evaluate $\oint \frac{z+2}{(z-2)^2(z+1)} dz$ where c is the circle $\lvert z\rvert = 3$.	**5**
2	Evaluate $\int_0^{1+i}(x^2 - iy).dz$ along the path (i) $y = x$ (ii) $y = x^2$.	**5**
3	If $f(z) = \frac{2z-1}{z}$ the find the value of integral $\int f(z)dz$ where C is the path of lower half of the circle $\lvert z\rvert = 3$ taken in anticlockwise direction	**5**
4	Evaluate $\oint tanz.dz$ where c: $\lvert z\rvert = 2$ by using Cauchy's residue theorem	**5**
5	Evaluate $\oint. \frac{sinz}{zcosz} dz$ inside a circle $\lvert z\rvert = 2$, by Cauchy's residue theorem	**5**
6	Evaluate the integral by Cauchy's residue theorem $\oint \frac{2z^2+z}{z^2-1} dz$ where C: $\lvert z-1\rvert = 1$.	**5**
7	Evaluate $\oint \frac{z+1}{z^3-4z} dz$ where C: $\lvert z+2\rvert = \frac{3}{2}$ by Cauchy's integral formula.	**5**
8	Evaluate $\oint \frac{\sin z}{(z-1)^2(z^2-9)} dz$ where C: $\lvert z-3i\rvert = 1$ by Cauchy's integral formula	**5**
9	Evaluate $\oint \frac{z^2}{z^4-1} dz$ where C is the (i) upper half of circle $\lvert z\rvert = 1$ (ii) lower half of circle $\lvert z\rvert = 1$.	**5**
10	Evaluate: $\int_0^{2\pi} \frac{2}{2+\cos\theta} d\theta$	**5**