	Loplace!
A	Transform and the substitute of the substitute o
	$L\left\{f(t)\right\} = \int_{0}^{\infty} e^{-st} f(t) dt = f(s) + \frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
	HORET TO BOTH OF BOTH OF
	Standard formula Other Trigonometric
1)	$\lfloor \{1\} = \frac{1}{5} \qquad \qquad   SinAcosB = \frac{1}{2} \left[ Sin(A+B) + Sin(A-B) \right]$
2>	L{eat}= $\frac{1}{5-9}$ 2) cos Asin B= $\frac{1}{2}$ [sin (A+B)-sin (A-B)]
3>	[ { e-at} = = 1 3) cosA cosB = 1 [ cos(A+B) + cos(A-B)]
4>	[ { sinat } = a . 4) sinAsinB== [(05(A-B)-(05(A+B)]
	$5^2 + 9^2$ $5) \sin^2 x = 1 - \cos 2x$
5>	$L\{sinhat\}=\frac{a}{520}$
1	35-6 (3 6) CO52 = 1+ CO322
6>	$L\left\{ \cos at \right\} = \frac{5}{240^2}$
	6> 51n32=1/4[35mx-51n32]
#	L{coshat}= 5202 cos32= 14[3cosx+cos32]
e	
8)	13+07=0! or $10+1$ 7) $3m(-x)=-5mx$
	$L\{t^2 = \frac{n!}{5^{n+1}} \text{ or } [n+1] $ $f$ $f$ $f$ $f$ $f$ $f$ $f$ $f$ $f$
95	
-17	$\lfloor \frac{cat}{s-alogc} = \frac{1}{s-alogc}$ 8) $\frac{1}{s-alogc}$ 2 $\frac{e^{x}-e^{-x}}{2}$ $\frac{coshx}{2}$
	ottele compa (a) todeo) = Cospat (a) otto
-	Types!-
200-1	
-	
plac	Ligent fit) = fis-a) ( se-st tit) dt
301975	L(E +(C) ] = + (S+4)
27	Multiplication but the Ministra butter
-37	Multiplication by t 4) Division by 't'  L\{+0\f(t)\} = (-1)\d0\f(s) + L\{\f(t)\} = \int^0\f(s)\ds  ds^0
C. V	[+++++) = (-1) A + (3) A L 2 + (4) (3) ds
-(20)	0IS 1
0)-S	Langua T & Colomes C Langua T of Colombia
57	Laplace Tot Integral 6) Laplace Tob Derivative
	Laplace T of Integral 6) Laplace T ob Derivative  Laplace T of Integral 6) Laplace T ob Derivative  Laplace T of Integral 6) Laplace T ob Derivative  Laplace T of Integral 6) Laplace T ob Derivative  Laplace T of Integral 6) Laplace T ob Derivative
	T[\(\(\(\)\) = 2+(2)=2+(0)
	L {f"(t)}=52f(s)-5'f(0)-
	Uh (mg) = (2) 1 × 1 5°f'(0)

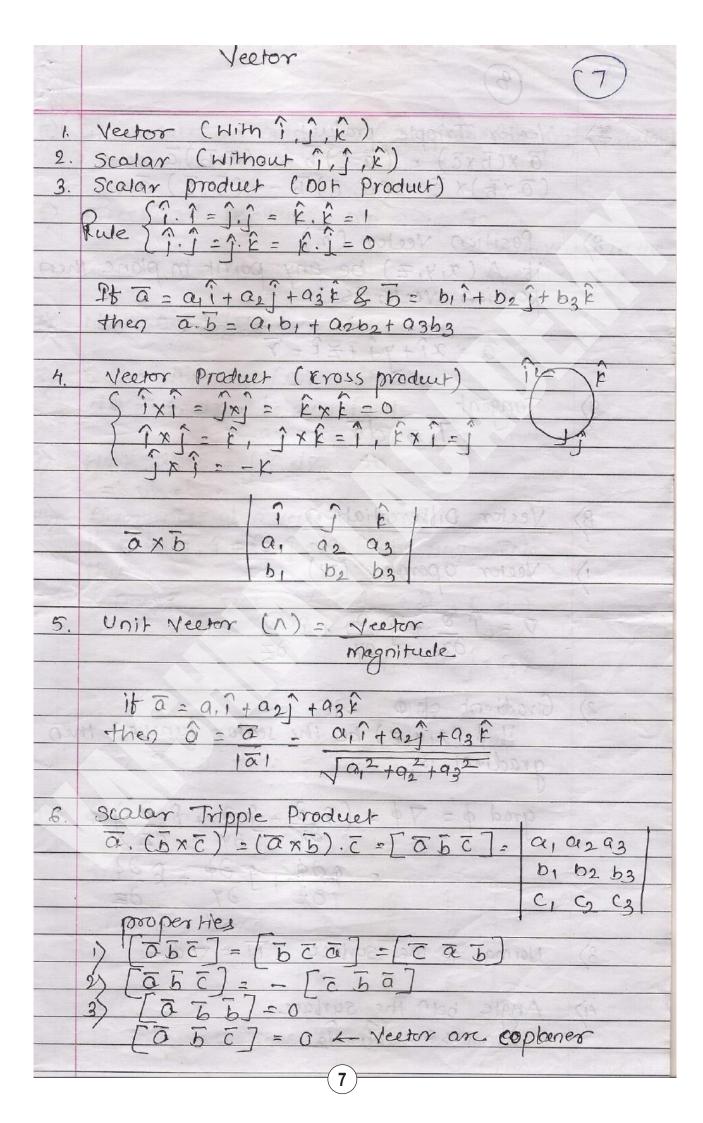
	76
4>	Periodic function
	$f(t+P)=f(t) \leftarrow Hint$
	period
	period Lifthij = -ps Se-st-fithidt
Desin(A B)	
(8-0) (8)	The Lifet) of scale prop. 9) second shifting property  If Lifet) of conditions are conditions property.  Lifet-a) of conditions property.
(8-A) eon +(	It [ [ f(t) ] = f(s) . [ [ f(t-a) ] = e-as f(s)
1(84A)co)-	then L {f(at)} = = f(3 a)
	349 5 sinty 1 - (0521)
	Laplace Inverse Types Types
- 7	L'i } = 1 5) Heanside
- 2>	L' {5-9}= etat a) L.T
3>	L' $\{\frac{1}{5}\}^2 = 1$ 5) Heanside L' $\{\frac{1}{5}\}^2 = e^{4}$ a) L. $\{\frac{1}{5}\}^2 = e^{4}$ L? HCt-a) $\{\frac{1}{5}\}^2 = e^{4}$ L? HCt-a) $\{\frac{1}{5}\}^2 = e^{4}$
4)	1-15 4 5 Ginat
	L) 8(C -)/1(C -)/- 0 +(S)
5/	$L^{-1}\left\{\frac{a}{s^2-a^2}\right\}$ = sinhat
(2)	b) Inverse  L-1 \{ \frac{5}{5^2  q^2} \} = \text{Cosat}  \text{L-1}\{ \frac{e^{-as}}{5} \text{F(s)} \} = \frac{f(t-a)}{1} \text{H(t-a)}
2	L-1 \{ \frac{5}{5^2  q^2} \} = \cos at \ \ \[ \frac{1}{5^2  q^2} \] = \cos at \ \[ \frac{1}{5^2  q^2} \] = \frac{1}{5^2  q^2} \] = \( \frac{1}{5^2  q^2} \) = \( \frac{1}{5^2  q^2
30	L' { 5 2 92 } = Coshat 6> pirac delto
1/	L' \} = Coshat 6\ pirac delto  17 L\{ \delta(t-a)\} = e^{-as}
8>	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
	$[-1] \left\{ \frac{1}{2n} \right\} = \frac{\pm n-1}{(n-1)!} \text{ or } \frac{\pm n-1}{(n-1)!} \text{ or } \frac{\pm n-1}{(n-1)!} = \frac{2\delta(\pm -a)f(\pm)}{(a)!} = 2\delta(\pm -a$
	7) Application of Laplace T
	Types!- Assume
D	Partial fraction ( L{y}= y(s)
2>	Convolution theorem L{yi}= 54(s)-564(0)
3)	[1 { f, (s), f2(s)} = [ f, (u), f2(t-u)du [ { y"} = 52y(s) -
	52/(0)-50/(0)
3>	Log Minvorse
	[-1 {f(s)} = - \frac{1}{2} \fr
(0)305=(2	
-(0) 4)	Division by 's'
(,0) 1 4° e	L'\{\frac{1}{5}\text{xf(s)}\}=\frac{t}{f(u)}du.

fourier Series:-	91,4
interval	is the read of one to
ň	6 12
(0,21) (-1,1) (0,24) (	-1, 1) o for boo for 17 (C.
	6 2 2
A) fourier series in '1' interval	fourier Series in 7 interva
$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} (a_n \cos n n x + b_n s in)$	$\frac{nne}{l}$ ) fex) = $\frac{a_0}{2} + \sum_{n=1}^{\infty} la_n (osne+b_n)$
2 h21.	1 2 n21
as= 1 Standa	ao: 1 (tex)da
an = 1 steen cos none dx	an 2 to stear cos ne de
bn= ff(x) sin nmedx	bn = 1 stex) sinoxdx
	The de the de the
B) Greneral store	0 2 1
is sing = sing on - 0	3 15 more same
11) coso = cos2n1 = (-1)2	n=e121011=1
(111) COSNA = e + inx = (-1)	0
N) COS (1±0)21 21	X 1/4 6 7 8 - (07)
cos (1 ± 2n) 1 = -1	
cos (1±0) 12 =-(-1)	2
v) d constant = 0, Scon	
vi) de 2n = nxn-1 frnd	12 = 20th
000	Dt1
vii) (u-volz! 1) uasitis	, V kg integration
	t, 2nd lea integration
+-+	
c) Types of function [-,+!	I - who was sender
a) Even b) o	
$f(x) = x^2(-n, \pi)$ f(x)	$(-1,1)$ fex)= $x+\alpha^2$
put x = -x, b(-x) = (-x)2 pu	「人って」 サイベル こうけいへん
= X2	$=-\sin x$ $pu = x = -x$
=Same	= sign f(-x) = -x+(-
for is even, bor = 0	change = -x+
	for is odd as = o for is NENO
	0920

	0	
0)	12/8 -= 20/1001	
i)	It $\pi^2$ and $\pi^2$ are known, then add $\pi^2 g n^2$ 6 12  Ph $\pi^2$ and $\pi^2$ are valued to the second secon	
	6 12	
2>	It Te and re are unteners, then	
	6 12	
slori J	for Continuous for Discontinuous for	
i tanea	put x=0 in f.s. find new functions	
	fex) = of [sim tex) + win tex]	
	16 (202) = 200 - 15 (202) = 15 (202) of 15	
p acus	then put x=0 in f.s.	
E>	Parseval's Identity $ \int f(x)^2 dx = 1 \left[ \frac{a}{2} + \sum (a^2 + b^2) \right] $	
	(f(x)2dx = 1 [ a) + E (a) + b)	
	2 n21 3/01/2 (pronois) (8	
	complex form of f.s.	
	H) 6020 = 6400 (-1) 20 = 6201 (1)	
	(1) = 501 = 8 + 10 200 (m)	
	$f(x) = \frac{8}{5}$ Che intra $f(x) = \frac{8}{5}$ Che inx $n_{2-\infty}$	
	n=-00	
	$C_n = \frac{1}{24} \int t(x) e^{-\frac{1}{24\pi}} dx$ $C_n = \frac{1}{24\pi} \int t(x) e^{-\frac{1}{24\pi}} dx$	
	2 - 5 KYA (5116) / 1 - 1 (16) (5110) + 11.	
	$8ihk = e^{k} - e^{k}$ $coshk = e^{k} + e^{k}$	
	2-2002) 1-000 - 20 1 (in	
	$e^{\pm 2i\eta n} = 1$ $e^{\pm i\eta n} = (-1)^0$	
	(the last of the said of the s	
	JeAx sin Bx dx = eAx (A. sin Bx - Bcos Bx)	
	$A^2 + B^2 - \cdots$	
	$\int e^{Ax} \cos Bx  dx = e^{Ax} \left( A \cos Bx + B \sin Bx \right)$ $A^2 + B^2$	
01/34		
Stax 31	$\frac{101}{100} = \frac{100}{100} = $	
( - = Y	(x-1012-11-12-12-12-12-12-12-12-12-12-12-12-1	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
$X_{C} = (X_{C})^{2}$		
	A Reagnal To and one of of	

	Complex Variable
	Basic Mro!
1)	Complex Number
	2 2 2 + iy - ob 30 30 30
2)	complex conjugate (i ka sign change)
	$Z = \chi - i\gamma$
3)	Modulus man har man har
	121 = 122+ y2 = r
4)	Amplitude
	$0 = ton^{-1}y/x$
5)	function of Z
	\$(Z) = u+iv = W
	special formula
6)	principal value
	109 (x+iy) = 109 (x2+42)+itan 2
-CODE	Secure 10 Delegations & English of Story
4>	Euler's formula symptomic formula
	$e^{i\alpha} = \cos\alpha + i\sin\alpha$
0)	e'o = coso-isino di siylorit not (sollibro)
.8>	sin (A+B) = sin A cosB + cosA sin B
11)	
/.	sinh (AIB) = sinha coshB ± coshA sinhB cos (AIB) = cos A cosB = sinA sinB
(11) (V)	cosh (A 1 B) = coshAcoshB ± sinhAsinhB
18)	Cost (A LB) 2 Cost (A Cost (B L Sh) MASH MB
	Imaginary Angle
	siniz isinha   sinhix = isina
	cosix = coshx coshix = cosx
	* - Hormonic temption ( Loplace and
	Derivotive
1)	Derivative  de logber = fix) de fras
2)	d tan'tex) = 1+tex)2 d tex)
	(章) 打一个(宝) (宝) (宝) (宝) (宝) (宝) (宝)
3>	$\frac{d}{dn} \int_{-\infty}^{\infty} \frac{1}{(n+1)^2} \frac{d}{dn} \int_{-\infty}^{\infty} \frac{d}{(n+1)^2} \frac{d}{dn} \int_{-\infty}^{\infty} \frac{d}{(n+1)^2} \frac{d}{dn} \int_{-\infty}^{\infty} \frac{d}{(n+1)^2} \frac{d}$
36	drefex) fexi2 dr

		The second secon
4)	du vdu -udv	Complex Yes
	dx v y2	1900 0000
5)	duy - udy , y dy	ds = C \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	de uv = udv +v du de de	dc=-5 JC=5
6)	dx x x2	T g) Complexe Conjuga
	dx x 22	10000000000000000000000000000000000000
7)	$\frac{d}{dx} f^{n}(x) = n f(x)^{n-1} \frac{d}{dx} f(x)$	entroppi (2
	dx	FV2 VX TIE
		statilgot A
	Integration	Selvizo Con Line
)		Si Via Maria
1	Ja	WE KNOW I WAS
2)	(see2x dx = tanx	Olivery to be 20
	Scosee2ndx=-cotx	of six lossistanta (a
- 3/	+ Paolis (Sulva	log faring - Vin
	Note !- Desivative & integration	n of Hyperbolic function
	note! - Desivative & integration are always possitive	acknowled at a total office
		MINEL WENT - PRO
*	condition for Analytic func	tico de la constantina del constantina de la constantina de la constantina de la constantina del constantina de la const
		(2)
	Cartaian form	Polar form
	The course of the same	e - uztavine (il
	A COSB E SINA LA	1
	AY are a shaosan	97 700
	du - dv @ du dy	94 - 1 9v
	on dy g du -dy	dr 700
	sinkix sisinx	$\frac{1}{2}\frac{\partial u}{\partial v} = -\frac{\partial v}{\partial v}$
	COSPINA COSPA - LETTE - E	) 00 0r
*	Harmonic function Chaplace &	2907
	corression $\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 0$ g p	24 1 34 1 3 <sup>2</sup> 6 0
		30 + 1 20 + 1 20 = 0
	(a) by	The stand of the con-
*	) Z.Z= Z  <sup>2</sup>  Z  <sup>2</sup>   Z  <sup>2</sup>	16(2)12 18(2)12
11.	11127. 11/27 211/21/2 11/0	21/2 1/1 22 23 10 22
. 111	10(=),0(=)-10(=)=10(3	22 du2 22 de de
	<b>6</b>	



X)	Yester Tripple product
4/	$\overline{a} \times (\overline{b} \times \overline{c}) = (\overline{a} \cdot \overline{c}) \overline{b} - (\overline{a} \cdot \overline{b}) \overline{c}$
	$(\overline{a} \times \overline{b}) \times \overline{c} = (\overline{a}.\overline{c})\overline{b} - (\overline{b}.\overline{c})\overline{a}$
	The state of the first contract to
8)	Position Vector (7)
	it A(x, y, z) be any point in plane then it's
99	position vector is.
	マ=21+41+2年=ア
3/	THE KICKET PROBLEM (EXOLS PROBLEM)
9)	Tangent 0-9 x 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	Tangent $T = d\bar{x}$
	dt dt
8	Vector Distrerentiation
٨	Veerer Operator (7)
-7	Vacation of period of the second of the seco
	D= Jo + Jo + Fo
	dx dy dz
2)	Gradient of p
	it & (x, y, 7) be the scalar function then its
	gradient is.
A	grad $\phi = \nabla \phi = (\hat{j} \frac{\partial}{\partial z} + \hat{j} \frac{\partial}{\partial y} + \hat{k} \frac{\partial}{\partial z}) \phi$
120	$= \int \frac{\partial \phi}{\partial x} + \int \frac{\partial \phi}{\partial y} + \int \frac{\partial \phi}{\partial z}$
9 62	dx dy dz
0	Marmal to the contract N - To the
3>	Normal to the surface $N = \nabla \phi$
H)	Angle beto the surface
- 7	Angle beto the surface $\cos 0 = \hat{N_1} \cdot \hat{N_2}$

-1	
5/	It surface an armogenal (ormogenal or perpendicular) then $\overline{N}_1, \overline{N}_2 = 0$
	Then $N_1, N_2 = 0$
cs	Observiced Projection
- %	Directional Derivative DD = 70. a
	13 Unit Vector in the
	b) Unit Vector in the direction of \$
7>	Max. 0.0 =   \( \psi \)
1	
8)	Scalar Potential (d)
/	Scalar Potential ( $\phi$ ) $d\phi = f, dx + f_2 dy + f_3 dz$
	CONTRACT CON
9)	Work done = F. dr
	EBULLET LOT I.V IN LAST IN LAST
10)	Divergence of a vector  It F = f, î + f2 ĵ + f3 k be any vector  then
	it F = f, i + f2 i + fa & be any vector
	Div F = 7. F = (12 + 12 + 12).
	$\left(f_1\hat{i}+f_2\hat{j}+f_3\hat{k}\right)$
-	$\frac{\partial f_1}{\partial x} + \frac{\partial f_2}{\partial y} + \frac{\partial f_3}{\partial z}$
	it V. F = 0 then F is solenoidal
	11)er) F 15 30/er)0/ac
(1)	Curl of a vector
	St $\overline{f} = f_1 \hat{1} + f_2 \hat{j} + f_3 \hat{k}$ be any vector
	then
	Î Î Ê
	CUM E = 1x E = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	$\frac{\partial x}{\partial y} = \frac{\partial x}{\partial y} = $
	f, f2 f3
	it Avo a la Eliza
	it TXF=0 then F is Irrotational
aller and a second	((onservative)

(2)	Veeter Integration
	MARIN MENTERS OF THE PROPERTY OF THE PARTY O
1)	Green's theorem
	Space + ady - SS (da - DP) obedy
ri Prot	(de dy)
0 10	WHOOMS IN THE RESERVE TO THE RESERVE
2)	Stoke's theorem
	SF.dr = ( TXF) ds
	(a) lost da dy los (8
	2 do = 100x + 12 dz = 00
3)	
	JN.Fds=JJJ V. FdV → dxdydz
	J) N. Fas - J)) V. Far - dxdydz
3/2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	$\nabla \cdot F = \partial f_1 + \partial f_2 + \partial f_3$ $\partial x + \partial y + \partial z$
	020 04 05
	- + 6 4 4 6 1 X 6 4 4 5 4 7 6 4 4 7 6 4 4 7 6 4 4 7 6 4 4 7 6 4 4 7 6 4 4 7 6 4 7 6 4 7 6 7 6
	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )
	196 38 - 138
	See No - backer to an enterior first of
	- If V. F. to then F is solenoidely s
	Cont of a verter and a trul _(4
	18 F = 1,1+601+49 & be ony yector
	6 6 - 6 = 3xx = 7 - 1xu)
	36 2 76 2 30 1 TO THE REST OF