

LNCT GROUP OF COLLEGES



Name of Faculty: Dr. Soni Changlani, Dr. Soheb Munir,Santosh Jha Designation: Professor,Associate Professor,Assistant Professor Department: Electronics & Comminication Subject: Digital Signal Processing GES EC601 G TOWARDS BEING THE BEST" Unit:IV Topic:FFT

· Composite peut FPT MBDWRITEWE Date TINAL - SALA - -Satur (Fild more than two factors. Composit mo -> Example 3 -1+0- = - calu (cold - (old 6=2x3 N=PINI N=PINJ P1 -> mo. of subsequence goald and and No -> no. of elements in subsequences. Lin + ColA for N=6 = 2.3. ×102 ×13) Q= (1A-(0)A - C) Subsequences X(1) X(4) - 2 x(2) x(5) -3 Daleta + Cola = Cal for N=6= 2.3, for - M = 6 = 2.30. - (1) x(0), x(2), x(y) THA-S mlo) 2(11), 7(3), 2(15) 62 (1) [- M(2)) m12) 713 114.0 + 91.0 for N=6=302 -m(4)-(1) - (MS) - (=) mlar) M127+1) MOD) M(1) (1(2) THINGS -Sh=0, 1, (0, (N(4)) 713) 715) m14) 2(38) x (3r+2) - 201for N=2=3,5011 = (P) 7(37+2) A20, 1, ... (N-1) 1619 2 9,607 2(1) ale x(3r) (10, 3rk + E x(3r+1) (3r+1)K 9(4) 7:13) als X(K) = mlb) 7(7) 9/18 NI-1 (3r+2) WN F20 (3r+2) WN to b + m(3r) 91 (307) 715772 - \$ =0, 1, ..., (N-1) Mer for NOS $K(K) = \underbrace{\mathbb{Z}}_{20} \times \underbrace{\mathbb{Z}}_{20}$ NI-I (37-+2 FFT for N = PINI general Composit (NPI+ $\chi(K) = \underbrace{N_{2-1}}_{X(P_{2})} \chi(P_{2}) \lim_{N \to \infty} + \underbrace{E(P_{2}+1) (N_{1})}_{Y(N)} +$ NI-J +1.1% + Ex(8P1+P1-1) W 820 Cristin.

for N=6= () 6= 2×3 P1=2 N1=3. X(1) = X1(0) + W61 × 2013 DWR B 24(2) - () $\chi(2) = \chi_{1}(0) + w_{0} (2(0) + w_{0}^{4} \chi_{3}(0) + 0)$ $\chi(k) = g_{\chi(2r)}^{2} w_{6}^{2rk} + g_{\chi(2r+1)}^{2} w_{7}^{2rk}$ $\chi(3) = \chi_1(1) + w_0^3 \chi_2(1) + w_0^6 \chi_3(1) - (a)$ $\gamma_1(K) = x_1(K)$ N=6=3×2 - P1=3 M1=2 2 X(4) = x,10) + w, 4x2(0) + w, x 20) $X(K) = E = (3r) w_{0}^{3rk} + E \times (3r+1) w_{0}^{2}$ 0 × (5) = ×1(1) + w6 5×2(1) + w6 ×1 1) $t \in \kappa(3r+2) \omega(\kappa(3r+2))$ (F) 910) K=0, 1, 2, 00. 5 XO) m(3) -×(1) $X(K) = \xi \chi$ m(4) XCO (21916-51 K.O 01(2) ×(4) Three summation 115)~ representation XG of a pt- DFT of seg n(32) n(22+4) A x(3++2) x(37+5) & x(37+2) $\chi(K) = \frac{2}{5} \chi(2T) \frac{100}{5} \frac{2TK}{50} \frac{1}{50} \frac{1}$ x(K) = x1(K) = + W6 ×2(K) + W6 X3(R)-() = E x(2r) w6 + w6 E x(2r+1) r20 1 720 w6 K=0, 1, 2, K=0,1, K=0, 1, 5=19 K:0,1 (1) (1) 30+ DET L (1) Spt DETX)X (1) (1) Spt DETX)X put K=0 in eq. (7). X(K)= X+(K) + Wg K X+(K) $x(0) = x(0) + w_{0}^{2}x_{1}(0) + w_{0}^{2}x_{3}(0) + (0) = 1$ ×10) = ×10) +×210) +×310)-@

Put K=0 in equation (1)	MBD WRITEWELL	
we have,		
Xm(0) = Xm-3,2(B) + MN XM-3,2(0)	Xm(6) = Xm-1, 1(6) Date + MW ⁶ , XM-1, 2(6)	
$x_{m(0)} = x_{m-3,2}(B) + w_{N} + x_{M-3,2}(0)$	+ VIN. XM-2,2(6)	
(And the second	~ XM-3, 1 (2) + WIN ⁶ , XM-3, 2(2)	
and the second s	THE Bellin of Balls & Million	
for KIREL WELL & ELECTION K	. O.A. B. 100 min Dank +440	
$\chi(1) = \chi_{M-1,1}(1) + \chi_{M-1,2}(1)$	for K=Y,	
decit material (b)	Xm(7) = XM-2, 2(7) + M/N XM-1, 2(7)	
and the second and and and and and and and and and a	= XM-2+2 (3) + WN ' XM-2,2 (3)	
ford Kas . W. and alathan st	why Carolin and the way	
Xm(2) = Xm-1, 1 (2) + WN. Xm-1, 2(2)	and the second se	
(C)- (MIN (MAN) > - (N+(C))	Norduw (Asia Ser	
	alo) Xm-1,2(0) wini Xm(0)	
for with 3 roll 2 released	$x(2)$ (1. () $x_{m4+a}(1)$) = (1) $x_{m4+a}(1)$	
Xm(3) = XM-1,1(3) + WN. XM-1,2(K)	x(14) R(2h) Km-side) Wins Wins (Xm12)	
(D) and an and the first of the second secon	m(G) (Min Win (Xm(2))	
A presente Ma point 187	Marchanter (stati) 20 S Wind and My Xm(2)	
for x 24 to dual at whited		
Xm(4) D XM-1(4) + WN4.Xm-1,2(4)	10 . Externel Statur Con 100 1 - All +	
O TO REPARA PLA DES	nie) Timosista) Xml4)	
(mm = , Xm-10) + 1/14"- MM-1,2(0)	7(13) XM=2(2) Xm(5)	
with rol - (christie (contaile	m15) 2(2n+2) (2m+3,2(3)) (2m)(6)	
Since 11 is periodic by N/2	2117)	
° 4=0	DF GEN	
(B) & Baps mint B=11 mit	the Keolin (Min) to	
Tag to N of DET	Butterfly Structure :-	
3 and the set	Acionation and a contraction of the	
6 m 2 (0) 70 4 (0) 2 Hopt DFT	further even pt DFT (allan)	
34-	and. odd. point DF7 x(an+1)	
5 paiodicity = 4.	are broken in even and	
(2) x tow + (2) = X MAX = (2) + MAX = (1)	odde point DFT's - (spine)	
for 1425	provide the second states	
Xm(5) = XM-1, 1 (5) + WN - XM-1, 2 (5)	leix) equation (1)) & (D) are	
$(a) = \frac{1}{2} \times (a - 1) \times (1 - 1) \times (a - 1) $	further divided into even &	
	odd point DAT's.	
	3	

AKH			
all	In sad	ix I smaller DFT will be	* M-2+ (R) = E x (UD) SIDIN RITENE
	the point	- 2 further N/2 DFJ	$X_{M-2,2}(K) = E \times (4742) White$
		into combination - of 2. N/24	NORTHER SE 2(UTH2) WA
	point DI	PTV + (at sec-katt =)	Simily for eq. (4)
E.	Ind decor	mposition of hading 2 DIT	
		arts from eq. 3 \$ D.	$\chi_{M-1,2}(k) = \sum_{k>0} \chi(2n+1) W_{N/2}$
2.	and and	141 - 107 - 14 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	CENTING + (E) LEMB HE C
	from eq. (St (11 K, LAMY - A (12 LAY)	= () evon + () odd mz zu mz 2n+1
	(2)	N_{2-1} Mk. = $\leq \chi(2n) W_{N12}$	X M-132 (K) = XM-2,3(K) + WM X2
	X m-1,1 (K)	$z \leq \chi(2n) W N l_{2}$	
	1/2	-1 -1 2 m. 2 m. 2	North - E x (Unit) White - (5)
	Tobal No	~ r(an) WN	(Xm-2,B(K) = E x(Unt) WN/U - (3)
		(W)= (John + (). 1)	· × M-2,4 (K) > & x (un+3) M/H4 -
	The second	and (M22nd (M22nt) (Vin (3	DELANY ON F COLEMY = CEL
F.	(dag)	Nya-3 Star Star Star	for N=8 eq. (3) and (3)
н.	× m-1, 1 CR	() = E x(4n+2) WN (120)	represents roja point DPT
			which is comb of two
	+ 2	x (4n+2) WN	HI4 pt of q. Q. D.
	(alex 420)	Colomet (sto	to the rep. N/4 pt DFT
hick	Xmi,s(K)	= 5 x (4n) w/w - 0 (21)	of seque octan , xlumtz)
-	Cajmat /	h_{20} h_{10} h	al(4n+1), x(4n+3), for theme
	(that Wh	$\frac{N+1}{K} = \frac{2}{K} \left(\frac{2}{4} + 2 \right) \frac{NK}{4} = \frac{6}{4}$	eq. K=0,1,(N/4-1)
abu.	<u>.</u>	2 2 Mar 10 Mar	I NEA here O AO
- har	for K3	Busi en line structure :-	for N= 8 from eq. 5 \$13
- mer	8-0	represents NI4 pt OFT of	for K=0
A Part		presents internet	XM-1, (0) = XM-2,1(0) + WN X
- met	6	rid wed bhe bro	-(8)
	E9.6 2	spice ents M/4 pt DFT of	. P for K21 100
	seq. (Anter) 2'TRI Tring John	$X_{m-1,2}(1) = X_{m-2,1}(1) + W_{m}^{1} X_{m}$
	, W		z rij r
) = Xmy, (k) + WN Xme, 2(k)	(3) for NK=2 min = (2) + MM = (2)min
	wen By) further Otherstad, into a	XM-E, I (2) = XM-212 (0) + WN ² XMAN, 10
		et 190 throg labo	() - (k)
	A		1

for K=8. **MBDWRITEWELL** XM-1,1 (3) = Xm, 1(2) + MN3 XM-2,2(2) Date Page -(1) Rulo) (0)x 000 In eq. 8 Mar(1) 100 ×(4) for K=0 1 Cate (1 Mm12) × (2) XM-1,2(0) = XM-2,3(0) + WN XM-2,4(0) olm(3) *(6) (m) mmly) ×(1) 201 Los X=1 Umbs ×(5) 101 XM-1,2 (1) = XM-2,3(1) + WN2XM2,4(2) mul6) × (3) mm(r) 11/2 -m ×(Y) CUN G for K=2 TEL IN XM-1,2 (2) = XM-2,3(0) + WH. XM-24(0) No. of stages Larrie (0) for K=3. (Elm (P) N TV T TIT T Xm-1,2(3) = XM-2, 3(1) + WH XM-2(1) 1-300 + 140 3 200 + A = (0)X 07 1 weit 24 - (p) Wg _ Ws ws _ wis wis wi 1 2 8 MI6. MI6 W16 W16 W16 W16 W16 W16 M16. MI6 W16 U XM-2,1 1200 + 2 = A 16 210) NIA 32. 2 W/92 W34 W3 0,2,4, W312, W34 W3 6,8,10, 12,144 TWN2 5 MAJ 10 00 32 W32 2 32. 1+8-62 - 6 12,146 01 = d (2) XNL nin (4) 4 Wy PH/14 a(16) Kg-2121 X(D) 2(0) WN B ! 1-4 WAT . ie+1-×(+) 2(2) -1 nio) ×M2,1(0) ×(2) m(1) = (XM-2/1(2) (0)) n(u) 11 \$ W4 7(3) ×m-2,2(0)(-)X × (3) m12) -1 14 B powym - about 17 0 0-- 03 on 16) HEDIN +0 = (8)X 3 00 =A (= (A) M X(5) = 6- Wg= F VEN- DE (alx , H° an - C = (+)* - 24

1			
all			Qo. Determine 8-25 DFT of
	ocin)	= (-1)" using Radex 2	Sequence Date
		in in Juice FFT algorithm,	n(m) 29 1, 2, 3, 4, 4, 3, 2, 2
	(alianta -	J	wing Radix-2 DITFFT
	$\chi(n) = 0$	-1) = = + + + + + + + + + + + + + + + + +	hang hadig-2 DITFFT
	Laler L	n(0) A n(7)	L) n10) 5
6.	a(0)=1		
0	2(4) =+1	1º wo	4)mlA
	m(2)=1	2 W 2	3) (2) 5
	7(6) =+1		NON THE AND AND
	(MA(1) 2-1		2) 2162
	n.(5) = -1	war	2) (1(3) 5
	m(3) =1	12/	2) 715 Mar = inter and a fait
	n(y) 2-1		3) 2 + -1
		M WANT I N	4) m(3) 8
	X(0)2	4+W8E = 4+W8-4	()
Han	in the second	2 of S with with a	I) mlos - 3
- ni	X(1) 2	B+wg F = 0+Wg +0	
	San Tax Vand B	HIN OW GIN STANE I'M ALL O	$A = 5 + \omega_{0}^{2}(5) = 10$
	X(2) =	$-ctw^2 G = 0$	B = -3+ wo (1) = -3-1
	Praid the	the state of the state of the	c = 5-108 (5)=0
-hor	12, 12, 2, 10, 2 12, 142	0+Wg34 = 4-W8(-4) = 8	$D = -3 - w_0^2(1) = -3 + 1$
		The Call of the	$E = 5 + w_{0}^{2} (5) = 10$
the ser	(0) *	A-WE 20	$F = -1 \pm \omega \delta$
Sher			(1=5-100 (5)=0
	×(5) =	2 B-000 F 20 (1)	$H = -1 - 10^{2} = -1 + 3^{\circ}$
hora	COK.	av t	- (a) in the Co
	(6)	= c-wey 20 - cum	X(0) = A + W8 E
11 Anna Ran	(B) X	- ewa	X(1) = B + 10 0'.
motor	8(7)	2 D-008 H 20 L-	X(2) 2 Ct. W8 9-
			X(3) = D+ W834
m			× (4) = A-we E
		a la transmissione	X(5) = B- WB1F
			X(6) = C - W102 CJ
			$\Re(\gamma) = D - W e^{3} H.$
1 Ko		2	

 $\chi(0) = 2 + M_{0}(e) + M_{0}[2 + M_{0}(e)]$ FOR IDFT 3-MBDWRITEWELL 2 10+10 Date 2 anting A Page n.K. o(m)=15 X1K). MAI 20 N RED X(1) =]-3+ N182(1)] + N182 - 1+1 wo wso 1/1 2(0) Alon M102(3)] wei 1 mls) We = -3-9+ W181 [-1-30] xlap wa IM MIL) *(2) -3-j+(0,707-0.707j)(1-3j)wo 3 1/1 m13) XIG -we mly) was +(4) $\chi(2) = 0 + (-j) o_1 = 0$ wol way 2/524 (1-10) - wo² - wo² - wo⁻³ $\frac{1}{2}(2) = (-3+j) + (-0.707 - j0.707) \\ (-1+3j) \\ = -0.172 - 0.414j$ two TA) ×172 $\chi(4) = 10 - 10$ (potencing a flord) Qo. Determine 4" pt IDFT of - × (E-) * WING (12 NOC) × - $X(K) = \frac{1}{4} \pm \frac{1}{4} \pm \frac{1}{52} + \frac{1}$ $\frac{1}{15} = (-3 - \frac{1}{2}) - (0,707 - 0.707)(-1-3)$ = -0.172 + 0.414Radix -2. 2+ w4/2) = 4N/4 X(0)(1-1 + C 2 X(6) = 0 - (-g) = 0 = 00+144 (-254) -X3=X ×12) 1 25×1/4 x(7) = (-3+j) - (-0,707 - 0,707 j) (x14) 1-52 (a) 2-14/2) 20+ 1/4 141 $(-1+3)^{2}$ = 5.626 + 2.414 0-w4 (-252) × (3) 1+52 Tit)--andar X(K) = \$20, -5.828 - 2.4141 , 0.0172 NOR (-0.4149 + 0, 0.172 + 0.4149, 0.0172 + 0.4142, 0.0172 + 0.4142, 0.0172 + 0.4142, 0.0172 + 0.0172 $(n)_{2} = (1)_$ - any

Q -> Rading -2 Decimation on FREQUENCY MOBDWRITEWE Date Algorithmu :-\$f N= 2^M, N point DFT of seq. alm) is - $\chi(k) = \sum_{k=0}^{N-1} \chi(k) \chi(k) = \sum_{k=0}^{N-1} \chi(k) = \chi(k) \chi(k) = \chi(k)$ 2 ALZ $= \frac{N/2^{-1}}{E} \times (m) \times (m) + \frac{K}{E} \times ($ K20, 1, .. IN- $\frac{N|2-1}{X(K)= \sum x(m) \cdot M|N} + \sum x(m+N) M|N|^{2K} M|2K$ $\frac{N|2K}{M_{20}}$ HP - D-172 - D-114 Smee. WN = 1, WIN ND = -1 (half symmetry) and $\frac{N/2-1}{N} = \frac{N/2-1}{120} = \frac{N/2-1}{120}$ N/2 - 1 $X(K) = \sum_{N>0} \left[2(m) + (-1)^{K} \times (n + N) \right] M(N)^{NK} = 0$ K=2K. m leg. () (-)-0 = (2 (1) When k is even, put $X(2K) = \sum_{M20} \frac{M_{2-1}}{2} \sum_{M20} \frac{\chi(m) + \chi(m+\frac{1}{2})}{M_{20}} \frac{1}{M_{N}} \frac{M_{2}}{2} \frac{1}{M_{N}} \frac{M_{2}}{2} \frac{1}{M_{20}} \frac{M_{2}}{2} \frac{M_{2}}{2} \frac{1}{M_{20}} \frac{M_{2}}{2} \frac{M_{2$ $\frac{N/2^{-j}}{1} = \sum_{N \geq 0} \frac{g(n)}{NN/2} = \frac{M}{11}$ where $g(n) = \int \alpha(n) + \gamma$ $g(n) = \left[\alpha(n) + \alpha \left(m + \frac{m}{2} \right) \right] < 0$ 0,5,828+ (W) ++ and

Equation (1) represent N/2 point DF7 of MEDWRITEWELL sequence gin, for this equation K varies Date Page \$10m 0,1,2,000 (N-1). $\chi(2K+1) = \sum_{N=0}^{N|2-1} [\chi(m) - \chi(m+N)] W_N$ (2K+1)m. $\chi(2K+1) = \sum_{n=0}^{N|2-1} h(n) h(n)^{2Kn} . h(n)^{n}$ $\chi(2K+1) = \frac{N|2-1}{E} \prod_{N>0} h(n) \cdot N|N^{n} \int \cdot N|N^{2nk}$ $X(2K+1) = \sum_{n=0}^{N|2-1} h(n) n|_{N}^{n} \cdot h|_{N|2}^{nK} - (N)$ where $h(n) = \alpha(n) - \alpha(n+N) - \frac{1}{2}$ (VI) Équation De représente N point DET of The. sequence litron monon for this equation K varies from 0, 1, 2, ... (N-2) for N= 8 eq. (1) & () représents 4 pt 0FT of sequences gens and h(m) value". for these equations & valies from 0 to 3. $q(0) = \chi(0) + \chi(4)$ (a) g(1) 2 71(1) + 715) - () Even point DET. $g_{12} = n(2) + n(6) - @$ $g_{13} = n(2) + n(7) - @$

Q. Also, h(o) = n(o) - n(4) - @ MOBD WRITEWEL Date - (5) X WMM = Odd 0 $h(2) = m(2) - m(6) - \dots$ point DF -9 h(3) = m(3) - m(7) - hQ g(0) ×(o) nto) 8(1) N pt x(2) m(1) \$ 812) DFT. 7/4 m12) -(Even) 813) 7/6 213) hto) ml4) -X (1) hly) 715) × (3 N pt h12) ×15 mis DFT (odd) h(3) 7(4) 7(7) Radix - 2 smaller DPT will be the point 2. In and decomposition starts from (ID or ()) 10 from eq. (5) N/2-1 N/2-1 N/2-1 N=0 N=0 N=0 N=0nok 1 KOO, 1, 8, 00 (N-1)

 $\chi (2K) = \sum_{k=0}^{N/2-1} g(m) W N^{2nk} + \sum_{n=N/4}^{N/2-1} g(n) W N^{2nk} \cdot MBD$ M20 $M N N^{2nk} + \sum_{n=N/4}^{N/2-1} g(n) W N^{2nk} \cdot MBD$ Date ... N/4-1 = E gin) n/N + E g (m+N) WN 4) N20 N20 N20 N20 N20 N20 N/4-1 E g (m+N) WN 4) $= \underbrace{g}_{\text{M20}} \left[\underbrace{g}_{\text{M20}} \right] \underbrace{g}_{\text{M20}} \left[\underbrace{g}_{\text{M20}} \right] \underbrace{g}_{\text{M20}} + \underbrace{g}_{\text{M20}} \underbrace{g}_{\text{M20}$ $= \underbrace{\mathbb{E}}_{N>0} \left[g(m) \frac{2nk}{NN} + g(m+N) \frac{2nk}{N} \right] \frac{2nk}{NN} \frac{N|_2 k}{N} \int_{N}^{N} \frac{1}{N} \frac{2nk}{N} \frac{N|_2 k}{N} \int_{N}^{N} \frac{1}{N} \frac{1}{N}$ · *(2K) = E [glm) + g[m+N] (-1) K] MN - (7) for k is even k= 2x in eq. (?) X(4k) = E I gen) + g(m + N) I WN 4nk. $\chi(4k) = \varepsilon \left[g(n) + g(n+N) \right] \Lambda M/4 nk$ $\chi(4k) = \leq \left[A(n) \cdot W_{N/4} \right]$ (VIII) lohere. Ain)= gin) + g(n+N) - (A) for k is odd pat k= (2K+1) in equation $X(4k+2) = \sum_{N=0}^{N(k-1)} g(n+1) = g(n+1) = \frac{2n(2k+1)}{N}$ = $\frac{N/4-1}{420}$ = $\frac{1}{2} \left[\frac{g(m)}{2} - \frac{g(m+N)}{4} \right] W_N^{47/K} \cdot W_N^{2N}$

X (4K+2) = E Bn) Min Min/4 (X) R **MIBD WRITEWE** where B(m) = g(m) - g(m+N) - (x)gard 120 what and with I to the 12 + " what calle N=8 eq. (VII) and (A) sepresents 2 pt sequence. A(n) and B(n) . WN²⁴ for the What I HATTER) SALLA these equations K. varies as 100 0 and A(0) = g(0) + g(N) = g(0) + g(2) - ()A(1) = g(1) + g(3)st. $\theta(0) = g(0) - g(2)$ (h) + Coop X(AR) -(e) = M b(1) = g(0) - g(3)2 -pl/17 Ato) - (1) Gelit 9(0) . Alz) PFT CH xlo = (AA) XX LAY gis) (da) win x(e) NIPE 100 303 g12) Mg DFT 8(4) WN2 g13) 7(6) â REARING - TO GLOST - G - meinter - and the the the the the the the

h(0) 0.00) **MBD WRITEWELL** NKY X(L) Date (11) h(1) DFT ×(5) blo) wa h(2) X (3) N/4 DIL) Wg2 PH h(3) PPJ 7(7) - lost (1-1++- = ia-1= ail-in-"And-" 2(0) 40) A1071 xloj 11 glz) heine THEF A(1) 0 9(2) ×(4) -1 (1-10 TA 912) B(0)00 m12)= 7(2) 71 g(3) B(1) 051 ×(6) m13) < - - - -9-11-1 514 h(0) HE (0) ---14/20 miu) 2-1 -X(1) +1 h1=) (4) 7(5) mis) - 1 1 1 RE. CAT ¢ 400 h(2) b6) w80 × ×(3) m16> ~1 (0)x -1 413) 012000 m(7) (7) 21 CHIM S NZB x(n)= \$ 0, 1, 2, 3, 4, 5, 6, 7 2 Q. 34 1 A = 4+ 8000 = 12 B = -4+ ws2(-4) 2-4+ (+3)(-4) = -4+4 340 alle E= 8- woo'(8) =-4 AN (tim

Q. x(n) = 2" NZB **MIBD WRITEWELL** Date 17 000 010)1 th M(O) Was wo B 2-2 A(=) m14) Wat m12) 4 N(e) (dia Wez +1 -400 m167 64 7(3) 10,3 SCATIO we m(1) 2 R(H) 2+2 WEY wg2 m15) 32 11 × (5) WAS 10 wee -x (0) m13) WAG wo -7(4) m17) 128 Way A = 17+ wg°(64) = 85 D=CAR CODE $B = -15 + W_8^2(-60) = -15+60$ r 17- 000 (68) = -51 CZ (1)8 $-15 - w_0^2(-60) = -15 - 60$ 志 34+ w8° (136)= 170 2 ER (2)19 F 2 - 30 + wg2 (-120) = -30 + 120 9 84 34 - wool 136) = +02 42 CIA 14 -30 - Wg2 (-120) = - 30 -100] 42 EN E-+ (old 12700 $\chi(0) = 4 + \omega_6^{\circ} E = 2.255$ Mow; P x(1) = 13 + W64.F = 48.63 + j (116.05) Colk 17:00 X12) = C+ W624 2 -51 + 1021 ×(3) = 0+ wo34 = - 78.63 + 46.059 - lat 02300 -×(4) = A+ (-Wg°) E = - 85 2 B- wgtF = - 78.63 - 46.051 (r)r ×(5) (SJP C- 60824 = -51 - 1029 x(6) = 7(7) = D-W834 = 48.63-166.05] = Calp - Calp = Cala ~ × (14) = \$ 355, 48.63 + 116.05 , -53+102 , -78.63 +46.05 , - 85 , -78.63 - 46.059 , -51 -102 , 48-63 -166.057 }