hapter 9: AC sinosoidal steady - stale analysis appropuls op crise lid w.erf (railly alt = Non Sin WE 8= (42) f=1_(Hz) +Ne Tw=2Tf (rool/s) NP mm N,H) = Nm'Sinwt No (t) = Nm sin(wt + 0) = phase, phase shift 50 start carlier beal / & Lay No 14 leads with by O Will legs will by OFA stattator

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 $V_{1}(t) = V_{m} Sin(wt - 40) \leftarrow$ $L_{1}(t) = I_{m} cos(wt + 40)$ $= I_{m} Sin(wt + 40 + 90)$ $= I_{m} Sin(wt + 130) \leftarrow$ Sin in (4) leade Villby 140° Cos A Ac (2sinat)+10 Complex numbers 80) 25/21 A = Jans Y - Z=x+jy=12/cos0+j12/Sind Faco THE - 26.56 4.47 ZI 2 Cose + isine 20 2.82 المحجم او لنقريهم او نق مجم 2 7 2 + 6, 21-22 Scanned with

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AQA Phasor . Judia with the 641 >output. circuit input > Vm Coslut + QV Im Cos (wt + + i) 54 1 Vm lat Im Loi 1 ジ 1. ist * Resistor NH = Vmcos(wt+di) iA = Imcos(ut + Ai) S 601 -> · (+) 1 Ŧ, (At) R R MJ1 Pehasor Domain. Time Domain 1 78 v(t) = Ri(t)R 7 Vm e ulwt+OW RIme NH Vme RImeile \$ 9 in phase R JUL CA leads of by to



× * Inductor: I ilo alt EUWLA 1,H phasor damain ime domain NLH = L dily alt ilwt+Ou) Vme d Ime j (wt + Oc) ilut+Or Vme I.m.iw.e 90 10 jw lags v by 90 to Capa citor :14 + 0 #ilt) = C al wilt) C,F WH → Ime, jor - citu Nme juc, 40 jwc Juc er 10jwc $i = \Theta r + 90$ X & Q3 leads ~ by 90



THY 1161239411. +0 V= RI RN V V= Elsw) +0 V V=lowL)T 5 impedance, so EjwL n ~ Eliw = V V =- j 1 00 juc admit fance (jul C Jotop impedance Elin), 1 Impedance Element admittance Zliw] = R Yliw) 5 1 R C y (jw) = jwc Zliw = 12019 10 AP Ylow's I Zliw) = jwc 1 I mpedance : Z liw) Z(jw) 5 V 5 Nm/Or I Tm/A Z(j'w) = Vm 10r Qi Im 10r Qi Im/ 8; ac circuit 3 12/ 82 Z(ow) is a complex number, But Not sig/cos. Tenel de a phasos

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impedance 10z > 22(14) = 12/ B2 + 22 121 . R+ix R. 121 cor 2 reactance resistance 54 solve all the examples Page 30-71) (Note) Imag 10 Peonjugate > 5-10 real 5+ 0 5 e 6 180 S 6 6 6 pplication of KVL for phasor: 白衣 KVL: Vs(t)=Nilt) + Valt)+ Vnlt) Vn + 2n D Zey 5+15 5 Z1+ Z2+..+ ZM C 11 34 CALL IS GER ALLANDAR

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2. PRRRR & Application of KCI for Phasor: 20 I'T T, 1-6 1 2 Zn T 10 1 T Ka LI2 「し 20 30 ZI I SU. T, = 22 21+32 XIS I2 , Z (jwL) Find Zay: = j20 24 2020 our referencei 0 2000 الدعاهولها (Sin) 4 50.00 (-j 1 150 4mF Cos (2) = j 26. N W= lov/s Ceg : 20)//(-j25) 20-1 50 6 50+ -j26) 500 +20-150 1250 20-15 50 71 20) 50 -50 5 5 5 11 26.791-62.48 +20-150 346,297-68,190 20 -1 50 200 رج للزوايا 1 3,75 57. JL 2J Scanned with

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32.37 N N 0-mil 3.750 W*73.75 wc 102 73,75 = 1.35 mF alculate Volt): E-11070.5 \$0.5H 2000 10.0 m (=) ~(E) solt! 20 10 Cos (10+75) 1510 0000 10-0 Sphasor domain No. t 10/75 21 Volt -90 2011 (27-90) 10275 * 10/75 No, 12 -12+(10//15) -12 50 10+13 = 7,0712-60 N. Vo(H) = 7. 071 cos(10t-60) volb * 1 Uploaded By: aconsed with

F P 9 & Calculate will): Colt) de s 500 (Dis(8 e.5H jul 500 N = 1 1000 (r(f), 0.05 COS 2000, tto o° , IS = 0.05 5000 L - 3 500 ~ ilos so -90 Ţ. * 0.05/0 500 90-45 -135 45° - j 500 + 500 + jloso = To = 00 3535/-135 A \$: 205 0.03535 Cos (2000t + -135°) roms formation: X 12017 1 h 4 1 THEZ +C

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Trans & mation: at 20 b Q. 9 2: 201 1 Z 2, 71 A->ÿ >1 17 Zas 7.22 Z15 ZnZb+ ZbZe+ ZéZn 20 8+5+15 203-12 12:51 Z2, ZaZb+ZbZc +ZcZa 2bs Z1 23 20 5+53+15 Zes Zzzz Zg 5 Za Zb+ Zb Ze+ Ze Za 1000 2 70 2 7 Q.G - 2 21+22+22 * Series RL Circuit: Y Rizoso ill Logs (Volk) by (~- 90) iles lags 1/16 by 90 ill) EL=20mH KAE Valle Nolt) = 60 cos (200TH) N Fod i w, the Fodi 141 Ville = 200 0 7 202/03 =12.571 Uploaded By: อาเมียงเป็น

V 20 m 12.571 600 + 60 N K 10 5 60/0 5201 + 112 37 I 60/0 6010 03 20 32 * 112.57 Í 2.54 +0 1 -32.1 2/41 A 200716-32.11 = 2.54 008 'n 57.9 112.5 31.9 54 5 32.1 Ilag. by 90 2ag 3 by Vs 7 Coslor- 8 5 11 a I Dine Co

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1 11 000 Page 57: more 1(1)52 Vralt Valt Vs. (4) = 100 cos lot yolt, w, = 101/s Vseld) = 50005 (20t-10) Volt, W2 = 201/s -> Skperposition. IWL j10/ 1 10×1 10.0 Judue to Vsilt ana = 110 V31 100/0° I1-100/0° = 7.07/-45° 10+ 10 i.1As 2.07 cos (102 45') NW1 0 2021 120 10 # Iz due V82 14) room 507-10 I25 - 50)-10° 10+120 2.24/106.52° 50/120 10+120 i2(4) 2.24 cor (20 + 106, 57 + -> i(f) = i(f) + i2(f) = 7.07 costot + 45) A+2.24 cost 20++106.5) A 1 :15 i r -+ ; Scanned with

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T. 6 6 6 Nodal Analy Sis? • 1VA V, --) 12/0° I. 210 Wing Nodal - Ip + V3 > KCl at Node 2: $\frac{N_2 - N_1}{U_1} + \frac{V_2}{U_1} + \frac{V_2 - V_3}{U_1} = 0$ $V_1 + N_2$ -iV3 = 9 BCI at Node S. 210 = - Ve + (1+i) V3 3 $\rightarrow -2L_{2} = 1 V_{2} + \left(\frac{1}{-41} + 1\right)$ Solving for V3 - V3 = (8 +12) V · Jos V2 (8 + 126)A W Using mesh Analysis. and Will 6 Find Io using mosh - SC Io = I2 - I3 -0 BVL formesh 1. 10 12/0 = (1+1) Fi - JI I = 1-20 5. KVI for mesh 2! 5 $0 = -i I \vec{L} + (1 + i - i - i) \vec{L}$ 5 $L_2 = 2/0$ 1h Solving for Iz and Iz -> Iz=(18+126) Ip= 220 A The " a di 1.1 Io - (8 + 126) A

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Source Transformation: 134F in jh (1)2/0 D12/0° 11 7 Find to using source transformation SIL QVIA. 1(10 EJIN SIN 210 12/0(1 210 1. alit + + >> alit ale -7. (1+j1)r Vi 11 V1512/0 6(1+il)r 7 ZIN 2/00 1 22 I1 = Z25-j+Z1 = (1 12(1+1) -1-1 22 1-11 7 1 NI. 5 10+14 $\Gamma_{\Gamma} = I_1 + 2 lo^{\circ}$ -> IT s I. 5 Z2 20 5 26 22+



Superposition: -13% 100 EJIN Ve 14 (12/° T. Find Io using Superpostion. IN Jos ofme To Vs 17 12/1 U 10 N Vs + 1701 Sonnce Transformation -j1 21 201 DI2LOA NY Z -Lol In = (1/1/1) + 12/0° (1/1/1) + (1-ji) Sel Zar 15 <u>= 12</u> A HEV 1.00 2100 Tor due to I 2 il Zeg - \$ [1/ j] In لفا ورا فعاد Zel Pokal (2013) (2 180 x 2/180 Zeq Zeyt = [1/1/17-01 + 2/160 + 1 2+01 (1// 51 Q. Io s Ioi + Tor 8+026 1)5

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The Power of Superposition X 19017 100 + N3, [4] Valt Vs, (1), 100 (25/02 V W, r by/s/ a silo V12 (13 50 COS (201-10)) We = 20VIr * superposition is the Only method of comalying :i(t) + i,(t) + i, (t) e jurt 11 101 VE2 off 57 00 Vs. 6.44 11AI (Ar 100/0 + Vsi(1) = 100005 lot V CN1 LUSAA 150.F ill = 7.07 cos (10t-45) A 100 jwL R No off H = 120 N 520 50/-40 NE2(+)= 50 (05 (4-10)2 110 Ī, E0/ 178 Lely = 2. 24 Cos pot + 66. 23) 50/ 10+120 10+120 ·. i(H) = 7. 07 (05 (10t-45)+25, 24 cos /20t +106.57) Scanned with

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hevening and Norton's The orems : The in 10 % 0 M EIN A 213 (1)2/0° Vin 110 Find Is using They. -110 12 VAns Vo.C 12/02 2/0 I2 - 2A @12 = 2+10 = 2/0° 12+(1-11) 7,-(1)2 ØI. = 0 7-054 12+12 Vth-V-in + Vin +(i)(1-72)(J) (I2) =+11+2+01(7-55-2) 2+15+5 5+ 07 V -1 1 Zths [1/j1] + - j1 214 EN - 11 -17 111 20 Fo = VIN For = VIN 望 = <u>5+07</u> = -j+1+1 Vin E To 8+126 -

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