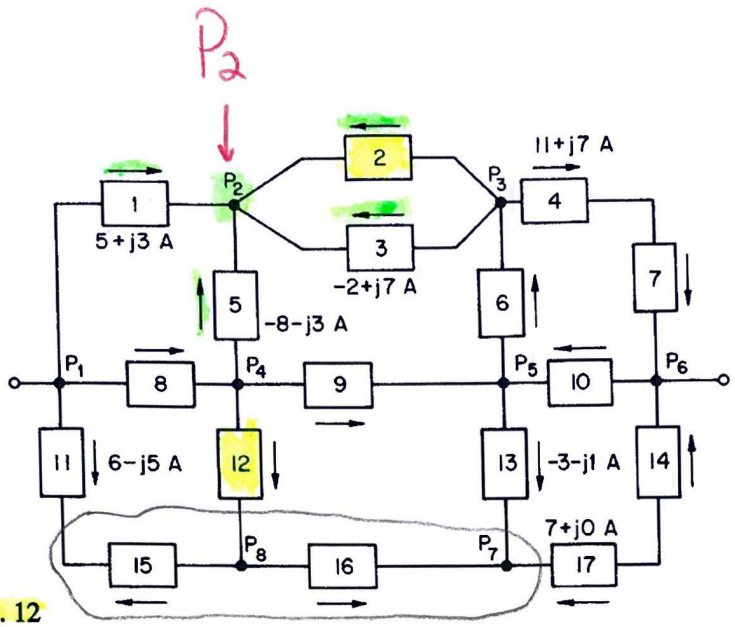

Fig. 12

without first finding other unknown current values. When many current values are unknown, it is often not possible to work a problem without using the shaded-area approach.

APPERCEPTION EXERCISE 2

1. By using double-subscript notation, find the value of I_7 in Fig. 11.

2. What is the value of current flowing through box 9 of Fig. 11?

3. The current through box 3 in Fig. 11 is_____.

4. In Fig. 12, current I_2 is (a)_____and current I_{12} is (b)_____.

5. In Fig. 12, find (a) I_6 and (b)114. → I_{14}

6. Current I_5 in Fig. 13 is_____. Use double-subscript notation.

7. By using double-subscript notation, find the value of I_X in Fig. 13.

8. What is the value of I_3 in Fig. 13? Use double-subscript notation.

9. The circuit of Fig. 14 shows a simple transistor amplifier. Find the value of the current through R_4.

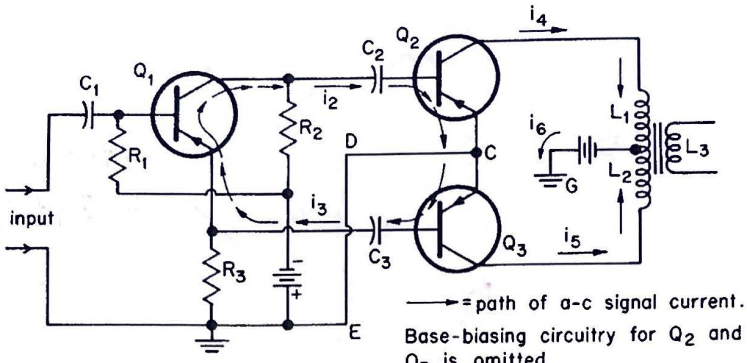

Fig. 15

12. We have seen that the currents i_4 and i_5, Fig. 15, are out of phase with respect to ground, and therefore cancel out, so that i_6 is zero. This being so, is there a voltage induced in the transformer secondary L_3?

ANSWERS

1. -7 + *j*5...Calling the shaded-area node *s*, we have $I_{s8} + I_{s1} + I_{s7} = 0$; $5 + j2 + 2 - j7 + I_{s7} = 0$; $7 - j5 + I_{s7} = 0$; and $I_{s7} = -7 + j5$. The current sense arrow of branch 7 points toward the node; thus $I_7 = -7 + j5$.

2. -5 – *j*2...$I_8 + I_9 = 0$; $I_9 = -I_8 = -5 - j2$

3. -1 – *j*5...$I_3 + I_2 - I_9 = 0$; $I_3 + (-4 + j3) - (-5 - j2) = 0$; $I_3 - 4 + j3 + 5 + j2 = 0$; $I_3 = -I - j5$

#4

4. (a) 5 – *j*7 A...Solve node P_2. $I_1 + I_2 + I_3 + I_5 = 0$; $(5 + j3) + I_2 + (-2 + j7) + (-8 - j3) = 0$; $5 + j3 + I_2 - 2 + j7 - 8 - j3 = 0$; $I_2 = 5 - j7$ A.

(b) -10 + *j*6 A...Shade boxes 15 and 16 and also nodes P_8 and P_7. $I_{11} + I_{12} + I_{13} + I_{17} = 0$; $(6 - j5) + I_{12} + (-3 - j1) + (7 + j0) = 0$; $6 - j5 + I_{12} - 3 - j1 + 7 + j0 = 0$; $I_{12} = -10 + j6$ A.

5. (a) 14 + *j*7 A...Solve node P_3. $16 - I_2 - I_3 - I_4 = 0$; $I_6 - (5 - j7) - (-2 + j7) - (11 + j7) = 0$; $I_6 - 5 + j7 + 2 - j7 - 11 - j7 = 0$; $I_6 = 14 + j7$A

(b) -7 + *j*0 A

6. 16 + *j*15 A if you drew the current sense arrow pointing toward node *c* or -16 – *j*15 A if you drew it toward node *d*...Arbitrarily draw the sense arrow of branch 5 pointing toward node *c*. Then $I_{dL} + I_{d4} + I_{d5} = 0$; $(I_9 + j_{11}) - (3 - j4) + I_{d5} = 0$; $19 + j11 - 3 + j4 + I_{d5} = 0$; and $I_{d5} = -16 - j15$ A. Since the assumed-sense arrow points away from node *d*, $I_5 = 16 + j15$ A. If your arrow points toward node *d*, the reference is shifted 180° and $I_5 = -16 - j15$ A.

Referenced on Page 15. Page 15 is correct.

7. 19 + *j*11 A...$I_{ax} + I_{a1} + I_{a2} = 0$; $I_{ax} + (13 + j8) - (-6 - j3) = 0$; $I_{ax} + 13 + j8 + 6 + j3 = 0$; $I_{ax} = -19 - j11$ A; thus $I_x = 19 + j11$ A because the sense arrow points away from node *a*.