We note that in both cases above, we use exactly \( n(k-1)/2 \) copies of \( B \) as edge labels. We illustrate these cases by Examples 1 and 2.

**Example 1 (Contd).** Case (1.2).
Both \( A_1 \) and \( A_2 \) are labeled by Technique 1, and \( A_4 \) by Technique 2. See Figure 1.

**Example 2 (contd).** Case (1.1).
Both \( A_1 \) and \( A_2 \) are labeled by Technique 1. See Figure 2.

5. **Case (2) -- Odd \( n \) and \( k \) a Multiple of 4**

In this section, we consider the labelings for the case of odd \( n \) and \( k \) being a multiple of 4. The methodology is fairly similar to the previous section, except that we need to do some extra work by swapping \( nk/4 \) pairs of edge labels at the end.

Recall that in this case, there is one half-class \( (A_{nk/2}) \), and \([n(k-1)-1]/2\) full-classes. We have two sub-cases:

(2.1) The number of classes, \([n(k-1)+1]/2\), is odd:

- For the \((nk-n-1)/2\) full-classes,
  - (a) label \( A_{nk/4} \) by Technique 2,
  - (b) label any of the remaining \((nk-n-1)/4\) full-classes by Technique 1,
  - (c) label the remaining \((nk-n-1)/4-1\) full-classes by Technique 2.

Similar to the arguments in Sections 3 and 4, we form \((nk-n-1)/4\) pairs of full-classes, and denote by \( f \) the resulting contribution to vertex labels.

For the half-class \( A_{nk/2} \), we label edge \((u, nk/2+u)\) by \( nk/2-u-1 \), for \( u = 0, 1, \ldots, nk/2-2 \), and label edge \((nk/2-1, nk-1)\) by \( nk/2 \). Note that the \( nk/2 \) edge labels form the set \( D \). The labelings above give the same vertex label \( nk/2-u-1+f \) to vertices \( u \) and \( u+nk/2 \), for \( u = 0, 1, \ldots, nk/2-2 \), and the same label \( nk/2+f \) to vertices \( nk/2-1 \) and \( nk-1 \).

We now swap the edge labels of \((u, u+nk/4)\) and \((u, u+nk/2)\), for \( u = 0, 1, \ldots, nk/4-1 \). Note that the effect of these swappings is to increase the labels for vertices \( u+nk/4 \) by \( nk/2 \), where \( u = 0, 1, \ldots, nk/2-1 \). (This is so because edges \((u, u+nk/4)\) and \((u, u+nk/2)\) have labels \( nk-u-1+f \) and \( nk/2-u-1+f \) respectively, and the difference is \( nk/2 \).) It is easy to see that consequently all vertices have distinct labels. We illustrate the effect of the swappings by Table 1.