Remarks: See § 7.3, pages 504 to 513

Answer

a)

| Member | Forces | $\Delta L$ (mm) |
|--------|--------|------------|
| 1 | 0 | 0 |
| 2 | $-\sqrt{2}\ F$ | $-4\sqrt{2}$ |
| 3 | $\sqrt{2}\ F$ | $4\sqrt{2}$ |
| 4 | $-2\ F$ | $-4$ |
| 5 | $F$ | $-4$ |
| 6 | $F$ | $4$ |
| 7 | $-\sqrt{2}\ F$ | $-4\sqrt{2}$ |
| 8 | $-\sqrt{5}\ F$ | $-2\sqrt{5}$ |

b)Assuming the direction of AC is fixed and removing the support at B:

| Joint | $u_x$ (mm) | $u_y$ (mm) |
|-------|-----------|-----------|
| A | 0 | 0 |
| B | 20 | 25 |
| C | -8 | 0 |
| D | 0 | 0 |
| E | 4 | -20 |
| G | -12 | 4 |

c) The truss should be rotated $2.5 \cdot 10^{-3}$ radians clockwise ( $\dfrac{25 \cdot 10^{-3}}{10}$ )

| Joint | $u_x$ (mm) | $u_y$ (mm) |
|-------|-----------|-----------|
| A | 0 | 0 |
| B | -20 | -25 |
| C | -10 | -10 |
| D | 0 | -20 |
| E | 0 | -30 |
| G | -10 | -20 |

d) Combined displacements:

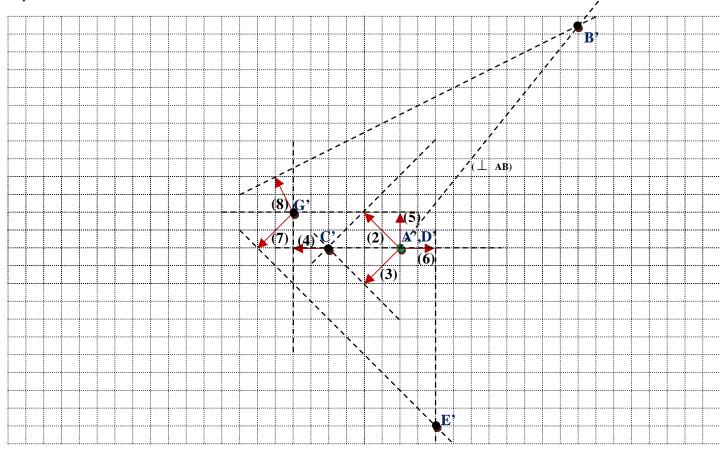| Joint | $u_x$ (mm) | $u_y$ (mm) |
|-------|------------|------------|
| A     | 0          | 0          |
| B     | 0          | 0          |
| C     | -18        | 10         |
| D     | 0          | -20        |
| E     | 4          | -50        |
| G     | -22        | -16        |

Work out:

Scale: 1 Square = 2mm