



Državni izpitni center



P 2 0 0 1 1 4 1 1 3

PREDMATURITETNI PREIZKUS

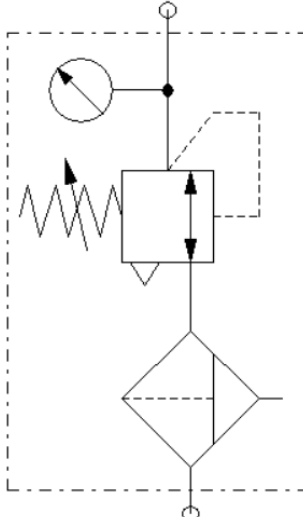
MEHATRONIKA

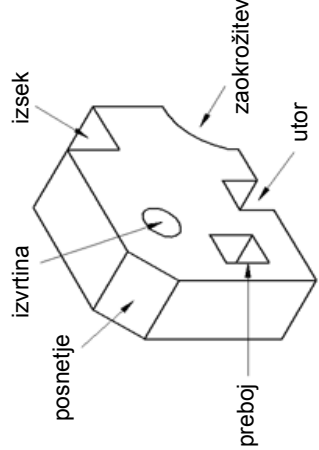
NAVODILA ZA OCENJEVANJE

PMP 2020

POKLICNA MATURA

1. DEL

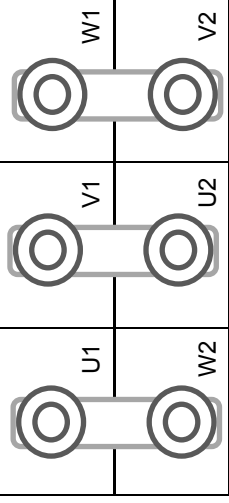
| Naloga | Točke | Rešitev | Dodatna navodila |
|--------|-------|--|---|
| 1 | 2 | <ul style="list-style-type: none"> ◆ zunanji obroč ◆ notranji obroč ◆ kletka ◆ kotalni element – kroglica | Štiri pravilne rešitve 2 točki. Tri ali dve pravilni rešitvi 1 točka. |
| 2 | 2 | $\tau_s = \frac{F}{\pi \cdot d_1^2} = \frac{F \cdot 4}{\pi \cdot d_1^2}$ $d_1 = \sqrt{\frac{F \cdot 4}{\tau_s \cdot \pi}} = \sqrt{\frac{4 \cdot 11000}{120 \cdot \pi}} = 10,80 \text{ mm} = 11 \text{ mm}$ $p = \frac{F}{A_p}, A_p = 2t \cdot p$ $p = \frac{11000 \text{ N}}{2 \cdot 8 \text{ mm} \cdot 11 \text{ mm}} = 62,5 \frac{\text{N}}{\text{mm}^2} < p_{\text{dop}}$ | Izračun premera 1 točka. Izračun kontrole na površinski pritisk 1 točka. |
| 3 | 2 | <ul style="list-style-type: none"> ◆ absolutni enkoder ◆ inkrementalni enkoder | Za vsako pravilno rešitev 1 točka. |
| 4 | 2 | <ul style="list-style-type: none"> ◆ E | Za vsako pravilno rešitev 1 točka. |
| 5 | 2 |  | Štiri pravilne rešitve 2 točki. Tri ali dve pravilni rešitvi 1 točka. |

| 6 | 2 | $X_C = \frac{1}{2} \pi f C \quad X_C = 3184 \Omega$ $\diamond Z = R + X_C = 1000 \Omega + 3184 \Omega = 4184 \Omega$ $I = \frac{U}{Z} = 0,0549 \text{ A}$ $\diamond P = I^2 \cdot R = (0,0549)^2 \cdot 1000 \Omega = 3,01 \text{ W}$ | Izračunana impedanca 1 točka. Izračunana moč 1 točka. | | | | | | | | | | | | | | | | | | | | | |
|-------|---------|--|--|--------|--------|----|------|------|----|---------|--------|----|---------|---------|----|---------|---------|----|---------|---------|----|--------|---------|--|
| 7 | 2 | <table border="1"> <thead> <tr> <th>Točka</th> <th>X – os</th> <th>Y – os</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>0,00</td> <td>0,00</td> </tr> <tr> <td>P2</td> <td>♦ 35,00</td> <td>♦ 0,00</td> </tr> <tr> <td>P3</td> <td>♦ 90,00</td> <td>♦ 15,00</td> </tr> <tr> <td>P4</td> <td>♦ 90,00</td> <td>♦ 35,00</td> </tr> <tr> <td>P5</td> <td>♦ 35,00</td> <td>♦ 50,00</td> </tr> <tr> <td>P6</td> <td>♦ 0,00</td> <td>♦ 50,00</td> </tr> </tbody> </table> | Točka | X – os | Y – os | P1 | 0,00 | 0,00 | P2 | ♦ 35,00 | ♦ 0,00 | P3 | ♦ 90,00 | ♦ 15,00 | P4 | ♦ 90,00 | ♦ 35,00 | P5 | ♦ 35,00 | ♦ 50,00 | P6 | ♦ 0,00 | ♦ 50,00 | Pet pravilno določenih točk 2 točki. Štiri ali tri pravilno določene točke 1 točka. |
| Točka | X – os | Y – os | | | | | | | | | | | | | | | | | | | | | | |
| P1 | 0,00 | 0,00 | | | | | | | | | | | | | | | | | | | | | | |
| P2 | ♦ 35,00 | ♦ 0,00 | | | | | | | | | | | | | | | | | | | | | | |
| P3 | ♦ 90,00 | ♦ 15,00 | | | | | | | | | | | | | | | | | | | | | | |
| P4 | ♦ 90,00 | ♦ 35,00 | | | | | | | | | | | | | | | | | | | | | | |
| P5 | ♦ 35,00 | ♦ 50,00 | | | | | | | | | | | | | | | | | | | | | | |
| P6 | ♦ 0,00 | ♦ 50,00 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 2 | $\diamond i = \frac{z_2 \cdot z_4}{z_1 \cdot z_3} = \frac{18}{35} \cdot \frac{50}{14} = 0,51 \cdot 3,571 = 1,821$ $\diamond i = \frac{n_1}{n_2} \Rightarrow n_2 = \frac{n_1}{i} = \frac{930 \text{ vrt/min}}{1,821} = 510,7 \text{ vrt/min}$ | Pravilno izračunano prestavno razmerje 1 točka. Pravilno izračunano število vrtljajev 1 točka. | | | | | | | | | | | | | | | | | | | | | |
| 9 | 2 | ♦ 0011 0000 1001 0001 | Pravilno zapisana rešitev 2 točki. | | | | | | | | | | | | | | | | | | | | | |
| 10 | 2 |  | Šest pravilno poimenovanih obdelav 2 točki. Pet, štiri ali tri pravilno poimenovane obdelave 1 točka. | | | | | | | | | | | | | | | | | | | | | |

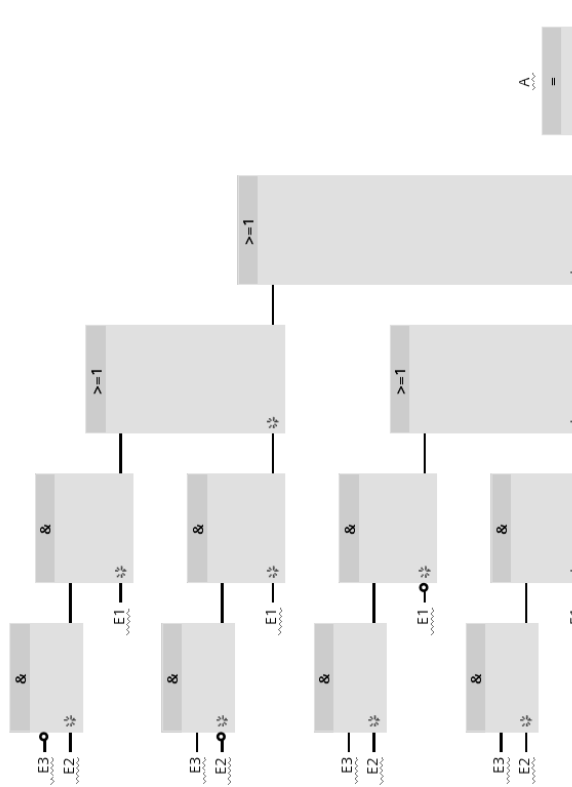
2. DEL

| Naloga | Točke | Rešitev | Dodatna navodila | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|----------|--|------------------|----------|----------|----------|----------|----|---|---|---|---|----|---|---|---|----|---|---|---|---|----|---|---|---|---|---|---|---|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------------------|
| 1.1 | 1 | <p>♦</p> <table border="1"> <thead> <tr> <th>E4 B2</th> <th>E3 B1</th> <th>E2 S2</th> <th>E1 S1</th> <th>A 1M1</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr> </tbody> </table> | E4 B2 | E3 B1 | E2 S2 | E1 S1 | A 1M1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Pravilna tabela 1 točka. |
| E4 B2 | E3 B1 | E2 S2 | E1 S1 | A 1M1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 | 3 | <p>♦ $A = E1 E2 E3 E4 + \bar{E1} E2 E3 E4 + E1 \bar{E2} E3 E4 + E1 E2 \bar{E3} E4$</p> <p>♦</p> <table border="1"> <thead> <tr> <th></th> <th>E1</th> <th>E1</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>E2</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>E2</td> <td>0</td> <td>1</td> <td>1</td> <td>E4</td> </tr> <tr> <td></td> <td>0</td> <td>1</td> <td>0</td> <td>E4</td> </tr> <tr> <td></td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td>E3</td> <td>E3</td> <td></td> </tr> </tbody> </table> <p>♦ $A = E2E3E4 + E1E3E4 = E3E4 \cdot (E1 + E2)$</p> | | E1 | E1 | | | E2 | 0 | 0 | 0 | 0 | E2 | 0 | 1 | 1 | E4 | | 0 | 1 | 0 | E4 | | 0 | 0 | 0 | 0 | | | E3 | E3 | | <p>Pravilno zapisana logična funkcija 1 točka.</p> <p>Pravilno zapisan KV-diagram 1 točka.</p> <p>Pravilno zapisana in minimizirana logična funkcija 1 točka.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | E1 | E1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E2 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E2 | 0 | 1 | 1 | E4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 0 | E4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | E3 | E3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|---------------|----------|--|--|
| <p>1.3</p> | <p>2</p> | | <p>Ustrezna elektropnevmatska shema 2 točki. Shema brez ustreznih oznak 1 točka.</p> |
| <p>1.4</p> | <p>2</p> | | <p>Ustrezna krmilna shema 2 točki. Shema brez ustreznih oznak 1 točka.</p> |
| <p>Skupaj</p> | <p>8</p> | | |

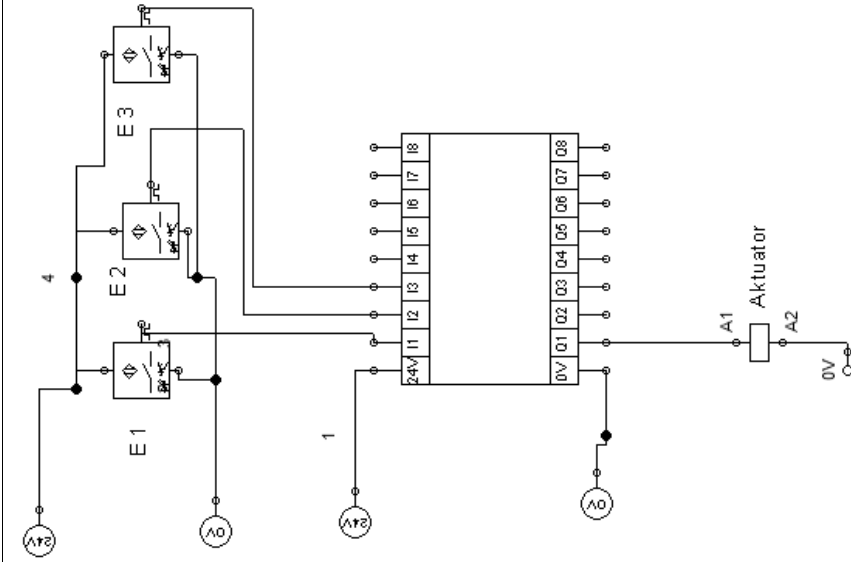
| Naloga | Točke | Rešitev | Dodatna navodila |
|---------------|----------|---|--|
| 2.1 | 2 | <ul style="list-style-type: none"> ◆  ◆ v trikot ◆ $I = \frac{1500}{230} = 11,217 \text{ A}$ | Pravilno narisana vezava in odgovor 2 točki. Samo zapisan odgovor ali samo narisana shema vezave 1 točka. |
| 2.2 | 2 | <ul style="list-style-type: none"> ◆ $I = \frac{1500}{230} = 11,217 \text{ A}$ | Pravilen izračun 2 točki. |
| 2.3 | 2 | <ul style="list-style-type: none"> ◆ $I = \frac{1500}{230} = 6,521 \text{ A}$ | Pravilen izračun 2 točki. |
| 2.4 | 2 | <ul style="list-style-type: none"> tri od: ◆ tok motorja ◆ moč motorja ◆ zagnonska krivulja (momentna karakteristika) ◆ obrati motorja ◆ čas pospeševanja ◆ čas zaviranja ◆ način zaviranja ... | Tri ali več pravilnih parametrov 2 točki. Dva pravilna parametra 1 točka. |
| Skupaj | 8 | | |

| Naloga | Točke | Rešitev | Dodatna navodila | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------|--|--|----|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.1 | 2 | <p>♦</p> <table border="1"> <thead> <tr> <th></th> <th>E3</th> <th>E2</th> <th>E1</th> <th>A</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>2</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>3</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>4</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>5</td> <td>1</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>6</td> <td>1</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>7</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> | | E3 | E2 | E1 | A | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 3 | 0 | 1 | 1 | 1 | 4 | 1 | 0 | 0 | 0 | 5 | 1 | 0 | 1 | 1 | 6 | 1 | 1 | 0 | 1 | 7 | 1 | 1 | 1 | 1 | Pravilno zapisana izjavnostna tabela 2 točki. |
| | E3 | E2 | E1 | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0 | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 1 | 0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 1 | 1 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.2 | 2 | ♦ $A = E1E2E3 + E1E2E3 + \overline{E1}E2E3 + E1E2E3$ | Pravilno zapisana neminimizirana enačba 2 točki. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 2 | ♦ | Pravilno napisan program 2 točki. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



3.4

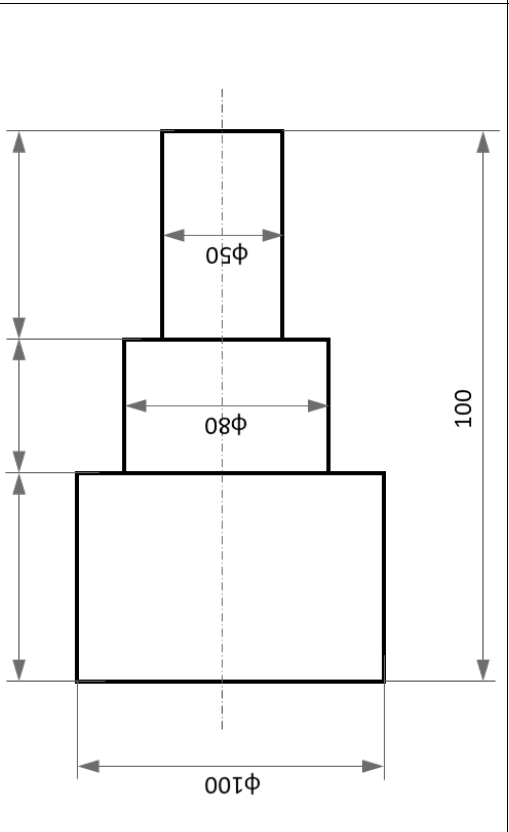
2



Pravilno narisano priklop na krmilnik 2 točki.

Skupaj

8

| Naloga | Točke | Rešitev | Dodatna navodila |
|---------------|----------|---------|--|
| 4.1 | 6 | ♦ |  <p>Pravilno določeni osnovni premer obdelovanca $\phi 100$ mm 1 točka. Pravilno določena dolžina obdelovanca 100 mm 1 točka. Pravilno določene posamezne dolžine obdelovanca 1 točka. Pravilno kotirani premer $\phi 80$ mm 1 točka. Pravilno kotiran premer $\phi 50$ mm 1 točka. Označena srednjica 1 točka.</p> |
| 4.2 | 1 | ♦ | $n = \frac{v_c \cdot 1000}{\pi \cdot D} = \frac{110 \frac{\text{m}}{\text{min}} \cdot 1000}{\pi \cdot 100} = 350 \text{ vrt/min}$ |
| 4.3 | 1 | ♦ | N10 G00 X0 Z0 M04 S110 |
| Skupaj | 8 | | Pravilno izpisana vrstica primaknitve orodja 1 točka. |

| Naloga | Točke | Rešitev | Dodatna navodila |
|---------------|----------|---|--|
| 5.1 | 2 | <ul style="list-style-type: none"> ◆ $F_v = m \cdot g = 500 \text{ kg} \cdot 9,81 \text{ m/s}^2 = 4905 \text{ N}$ ◆ $R_e = 8 \cdot 80 \frac{\text{N}}{\text{mm}^2} = 640 \frac{\text{N}}{\text{mm}^2} \rightarrow \sigma_{\text{ndop}} = \frac{R_e}{\nu} = \frac{640 \text{ N}}{4 \text{ mm}^2} = 160 \frac{\text{N}}{\text{mm}^2}$ | <p>Pravilni izračun za vlečno silo 1 točka.</p> <p>Pravilno izračunana natezna napetost 1 točka.</p> |
| 5.2 | 2 | <ul style="list-style-type: none"> ◆ $\nu = \frac{F_{\text{max}}}{F} = \frac{12000 \text{ N}}{4905 \text{ N}} = 2,45$ | Pravilno izračunan varnostni faktor 2 točki. |
| 5.3 | 2 | <ul style="list-style-type: none"> ◆ $S_{\text{sk}} = \frac{2F}{\sigma_{\text{ndop}}} = \frac{2 \cdot 4905 \text{ N}}{160 \frac{\text{N}}{\text{mm}^2}} = 61,31 \text{ mm}^2$ <p>prerez jedra vijaka $S_{\text{vij}} = \frac{61,31 \text{ mm}^2}{4} = 15,33 \text{ mm}^2$</p> <ul style="list-style-type: none"> ◆ v tabeli izberemo M6 s prerezom $S = 20,1 \text{ mm}^2$ | <p>Pravilno izbran skupni premer 1 točka.</p> <p>Pravilno izbran vijak 1 točka.</p> |
| 5.4 | 1 | <ul style="list-style-type: none"> ◆ $a = \frac{\nu}{t} = \frac{1,6 \text{ s}}{1,6 \text{ s}} = 0,83 \frac{\text{m}}{\text{s}^2}$ | Pravilno izračunan pospešek 1 točka. |
| 5.5 | 1 | <ul style="list-style-type: none"> ◆ $F' = m \cdot g + m \cdot a = 4905 \text{ N} + 415 \text{ N} = 5320 \text{ N}$ | Pravilno izračunana sila 1 točka. |
| Skupaj | 8 | | |