



Državni izpitni center



P 2 4 3 1 1 0 1 1 3

ZIMSKI IZPITNI ROK

# STROJNIŠTVO

NAVODILA ZA OCENJEVANJE

Torek, 4. februar 2025

POKLICNA MATURA

Moderirana različica

**IZPITNA POLA 1**

| Naloga | Točke | Rešitev                                                             | Dodatna navodila                                                            |
|--------|-------|---------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1      | 1     | ♦ B                                                                 |                                                                             |
| 2      | 1     | ♦ C                                                                 |                                                                             |
| 3      | 1     | ♦ B                                                                 |                                                                             |
| 4      | 1     | ♦ B                                                                 |                                                                             |
| 5      | 1     | ♦ A                                                                 |                                                                             |
| 6      | 1     | ♦ 42,018                                                            |                                                                             |
| 7      | 1     | ♦ razcepka                                                          |                                                                             |
| 8      | 1     | ♦ 0,05                                                              |                                                                             |
| 9      | 1     | ♦ 7,66                                                              |                                                                             |
| 10     | 1     | ♦ držalo ali vpenjalo (stružnega noža za hitro vpenjanje/zamenjavo) |                                                                             |
| 11     | 2     | ♦ 2<br>♦ 4<br>♦ 1<br>♦ 3                                            | Za štiri pravilne rešitve 2 točki, za tri ali dve pravilni rešitvi 1 točka. |
| 12     | 2     | ♦ 4<br>♦ 3<br>♦ 1<br>♦ 2                                            | Za štiri pravilne rešitve 2 točki, za tri ali dve pravilni rešitvi 1 točka. |
| 13     | 2     | ♦ 2<br>♦ 3<br>♦ 4<br>♦ 1                                            | Za štiri pravilne rešitve 2 točki, za tri ali dve pravilni rešitvi 1 točka. |
| 14     | 2     | ♦ 2<br>♦ 1<br>♦ 3<br>♦ 4                                            | Za štiri pravilne rešitve 2 točki, za tri ali dve pravilni rešitvi 1 točka. |
| 15     | 2     | ♦ 3<br>♦ 2<br>♦ 1<br>♦ 4                                            | Za štiri pravilne rešitve 2 točki, za tri ali dve pravilni rešitvi 1 točka. |

| Naloga | Točke | Rešitev          | Dodatna navodila                 |
|--------|-------|------------------|----------------------------------|
| 16     | 1     | ♦ $40^{+0,05}_0$ |                                  |
|        | 1     | ♦ 40<br>♦ 40,05  | Za obe pravilni rešitvi 1 točka. |
| Skupaj | 2     |                  |                                  |

| Naloga | Točke | Rešitev          | Dodatna navodila |
|--------|-------|------------------|------------------|
| 17     | 1     | ♦ 1,6            |                  |
|        | 1     | ♦ R2,25 ali 2,25 |                  |
| Skupaj | 2     |                  |                  |

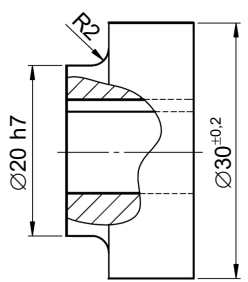
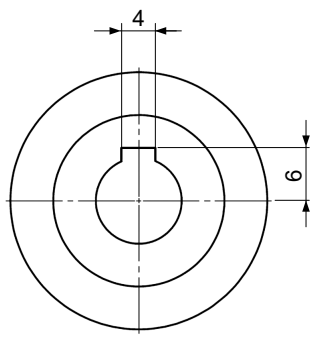
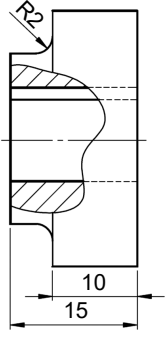
| Naloga | Točke | Rešitev  | Dodatna navodila                                                                                                                        |
|--------|-------|----------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 18     | 2     | <p>♦</p> | <p>Za pravilno narisana diagrama <math>F_N</math> in <math>F_T</math> 1 točka, za pravilno narisani diagram <math>M</math> 1 točka.</p> |

| Naloga | Točke | Rešitev                                                | Dodatna navodila |
|--------|-------|--------------------------------------------------------|------------------|
| 19     | 1     | ♦ $q_{r1} = q_{r2}$<br>$A_1 \cdot v_1 = A_2 \cdot v_2$ |                  |
|        | 1     | ♦ $v_2 = \frac{A_1 \cdot v_1}{A_2}$                    |                  |
| Skupaj | 2     |                                                        |                  |

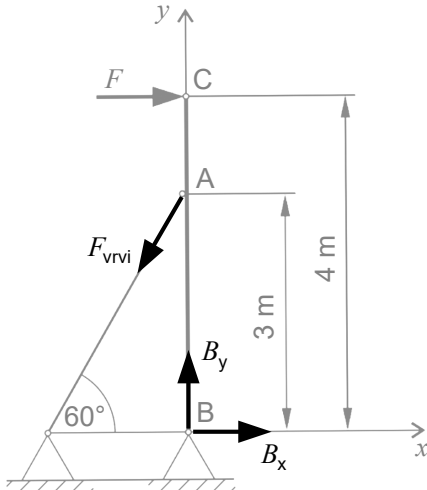
| Naloga | Točke | Rešitev                                  | Dodatna navodila |
|--------|-------|------------------------------------------|------------------|
| 20     | 1     | ♦ 0,1                                    |                  |
|        | 1     | ♦ $f = 0,6 \frac{\text{mm}}{\text{vrt}}$ |                  |
| Skupaj | 2     |                                          |                  |

Skupno število točk IP 1: 30

## IZPITNA POLA 2

| Naloga        | Točke    | Rešitev                                                                              | Dodatna navodila |
|---------------|----------|--------------------------------------------------------------------------------------|------------------|
| 1.1           | 1        | ♦   |                  |
| 1.2           | 1        | ♦   |                  |
| 1.3           | 1        | ♦  |                  |
| <b>Skupaj</b> | <b>3</b> |                                                                                      |                  |

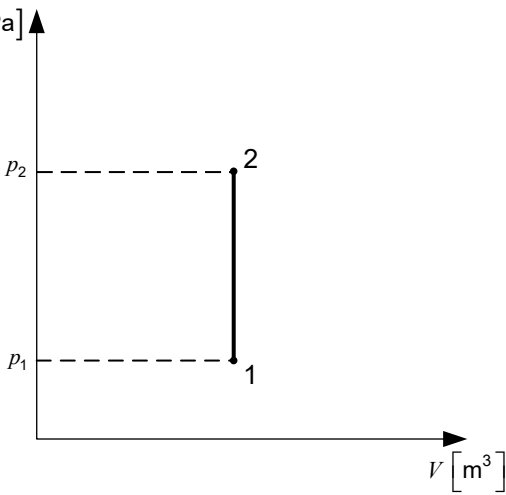
| Naloga    | Točke      | Rešitev                                                                                                                        | Dodatna navodila                 |       |  |   |           |            |                                                      |
|-----------|------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------|--|---|-----------|------------|------------------------------------------------------|
| 2.1       | 1          | ♦ prerez v več ravninah ali lomljen prerez ali prerez A-D                                                                      |                                  |       |  |   |           |            |                                                      |
| 2.2       | 2          | ♦ <table><tr><td>8H6</td><td>8,009</td></tr><tr><td></td><td>8</td></tr><tr><td>toleranca</td><td>mejna mera</td></tr></table> | 8H6                              | 8,009 |  | 8 | toleranca | mejna mera | Za mero izvrtine 1 točka, za obe mejni meri 1 točka. |
| 8H6       | 8,009      |                                                                                                                                |                                  |       |  |   |           |            |                                                      |
|           | 8          |                                                                                                                                |                                  |       |  |   |           |            |                                                      |
| toleranca | mejna mera |                                                                                                                                |                                  |       |  |   |           |            |                                                      |
| 2.3       | 1          | mera:<br>♦ 5<br>♦ 45°                                                                                                          | Za obe pravilni rešitvi 1 točka. |       |  |   |           |            |                                                      |
|           | 1          | odstopok:<br>♦ ±0,3<br>♦ ±1°                                                                                                   | Za obe pravilni rešitvi 1 točka. |       |  |   |           |            |                                                      |
| Skupaj    | 5          |                                                                                                                                |                                  |       |  |   |           |            |                                                      |

| Naloga | Točke | Rešitev                                                                                                                                                                                                                                                          | Dodatna navodila                 |
|--------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 3.1    | 1     |                                                                                                                                                                                 | Za vse pravilne rešitve 1 točka. |
| 3.2    | 1     | $\sum M_{i(B)} = 0$ $F_{vrvi} \cdot \cos 60^\circ \cdot 3 \text{ m} - F \cdot 4 \text{ m} = 0$ $F_{vrvi} = \frac{F \cdot 4 \text{ m}}{\cos 60^\circ \cdot 3 \text{ m}} = \frac{6 \text{ kN} \cdot 4 \text{ m}}{\cos 60^\circ \cdot 3 \text{ m}} = 16 \text{ kN}$ |                                  |
|        | 1     | $\sum F_{ix} = 0$ $B_x + F - F_{vrvi} \cdot \cos 60^\circ = 0$ $B_x = F_{vrvi} \cdot \cos 60^\circ - F = 16 \text{ kN} \cdot \cos 60^\circ - 6 \text{ kN}$ $B_x = 2 \text{ kN}$                                                                                  |                                  |
|        | 1     | $\sum F_{iy} = 0$ $B_y - F_{vrvi} \cdot \sin 60^\circ = 0$ $B_y = F_{vrvi} \cdot \sin 60^\circ = 16 \text{ kN} \cdot \sin 60^\circ$ $B_y = 13,856 \text{ kN}$                                                                                                    |                                  |
| 3.3    | 1     | $l_{vrvi} = \frac{3 \text{ m}}{\sin 60^\circ} = 3,464 \text{ m}$                                                                                                                                                                                                 |                                  |
|        | 1     | $\Delta l = \frac{F_{vrvi} \cdot l_{vrvi}}{A \cdot E}$                                                                                                                                                                                                           |                                  |
|        | 1     | $\Delta l = \frac{16 \cdot 1000 \text{ N} \cdot 3,464 \cdot 1000 \text{ mm}}{150 \text{ mm}^2 \cdot 210000 \frac{\text{N}}{\text{mm}^2}} = 1,76 \text{ mm}$                                                                                                      |                                  |
| Skupaj | 7     |                                                                                                                                                                                                                                                                  |                                  |

| Naloga | Točke | Rešitev                                                                                                                                                                                                                                                                                 | Dodatna navodila |
|--------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 4.1    | 1     | $T_1 = \frac{P_1}{2\pi \cdot n_1} = \frac{7,5 \cdot 1000 \text{ W}}{2\pi \cdot 1465 \cdot \frac{1}{60 \text{ s}}}$ $T_1 = 48,887 \text{ Nm}$ <p>ali</p> $T_1 = 9,55 \cdot \frac{P_1}{n_1} = 9,55 \cdot \frac{7,5 \cdot 1000 \text{ W}}{1465 \cdot \text{min}^{-1}} = 48,891 \text{ Nm}$ |                  |
| 4.2    | 1     | $d = \sqrt[3]{\frac{16 \cdot T}{\pi \cdot \tau_{\text{dop}}}} = \sqrt[3]{\frac{16 \cdot 48,891 \cdot 10^3 \text{ Nmm}}{\pi \cdot 65 \frac{\text{N}}{\text{mm}^2}}} = 15,6 \text{ mm}$                                                                                                   |                  |
|        | 1     | $d = 16 \text{ mm}$                                                                                                                                                                                                                                                                     |                  |

|               |          |                                                                                                        |  |
|---------------|----------|--------------------------------------------------------------------------------------------------------|--|
| <b>4.3</b>    | 1        | ♦ $b \times h \times l = (5 \times 5 \times 40) \text{ mm}$                                            |  |
| <b>4.4</b>    | 1        | ♦ $i = \frac{z_2}{z_1} = \frac{24}{15} = 1,6$                                                          |  |
|               | 1        | ♦ $T_2 = i \cdot \eta \cdot T_1 = 1,6 \cdot 0,98 \cdot 48,891 \text{ Nm}$<br>$T_2 = 76,661 \text{ Nm}$ |  |
|               | 1        | ♦ $i = \frac{n_1}{n_2}$<br>$n_2 = \frac{n_1}{i} = \frac{1465}{1,6} = 915,625 \text{ min}^{-1}$         |  |
| <b>Skupaj</b> | <b>7</b> |                                                                                                        |  |

| <b>Naloga</b> | <b>Točke</b> | <b>Rešitev</b>                                                                                                                                                                                           | <b>Dodatna navodila</b> |
|---------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>5.1</b>    | 1            | ♦ $p_1 = p_2$<br>$\frac{F_1}{A_1} = \frac{F_2}{A_2}$                                                                                                                                                     |                         |
|               | 1            | ♦ $F_1 = \frac{F_2 \cdot A_1}{A_2}$                                                                                                                                                                      |                         |
|               | 1            | ♦ $F_1 = \frac{F_2 \cdot \frac{\pi \cdot d_1^2}{4}}{\frac{\pi \cdot d_2^2}{4}} = F_2 \frac{d_1^2}{d_2^2}$<br>$F_1 = \frac{22000 \text{ N} \cdot (0,8 \text{ cm})^2}{(14 \text{ cm})^2} = 71,8 \text{ N}$ |                         |
|               | 1            | ♦ $F_1 = 2 \cdot F$<br>$F = \frac{F_1}{2} = \frac{71,8 \text{ N}}{2} = 35,9 \text{ N}$                                                                                                                   |                         |
| <b>5.2</b>    | 1            | ♦ $p_1 = \frac{F_1}{A_1} = \frac{71,8 \text{ N}}{\frac{\pi \cdot (0,008 \text{ m})^2}{4}}$<br>ali<br>♦ $p_2 = \frac{F_2}{A_2} = \frac{22000}{\frac{\pi \cdot (0,014 \text{ m})^2}{4}}$                   |                         |
|               | 1            | ♦ $p_1 = 1428415,6 \text{ Pa}$<br>ali<br>♦ $p_2 = 1429146,4 \text{ Pa}$                                                                                                                                  |                         |
| <b>Skupaj</b> | <b>6</b>     |                                                                                                                                                                                                          |                         |

| Naloga | Točke | Rešitev                                                                                                                                                               | Dodatna navodila |
|--------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 6.1    | 1     | $\diamond \kappa = \frac{c_p}{c_v}$<br>$c_v = \frac{c_p}{\kappa}$                                                                                                     |                  |
|        | 1     | $\diamond c_v = \frac{c_p}{\kappa} = \frac{1042 \frac{\text{J}}{\text{kg K}}}{1,4} = 744,3 \frac{\text{J}}{\text{kg K}}$                                              |                  |
| 6.2    | 1     | $\diamond p_1 \cdot V_1 = m \cdot R \cdot T_1$<br>$m = \frac{p_1 \cdot V}{R \cdot T_1}$                                                                               |                  |
|        | 1     | $\diamond m = \frac{2,5 \cdot 10^5 \text{ Pa} \cdot 200 \cdot 10^{-3} \text{ m}^3}{296,9 \frac{\text{J}}{\text{kg K}} \cdot 293 \text{ K}}$<br>$m = 0,575 \text{ kg}$ |                  |
| 6.3    | 1     | $\diamond Q = m \cdot c_v \cdot \Delta T$<br>$Q = 0,575 \text{ kg} \cdot 744,3 \frac{\text{J}}{\text{kg K}} \cdot (80 - 20) \text{ K}$<br>$Q = 25668 \text{ J}$       |                  |
| 6.4    | 1     | $\diamond \frac{p_1}{T_1} = \frac{p_2}{T_2}$<br>$p_2 = \frac{p_1 \cdot T_2}{T_1}$                                                                                     |                  |
|        | 1     | $\diamond p_2 = \frac{2,5 \text{ bar} \cdot 353 \text{ K}}{293 \text{ K}} = 3,01 \text{ bar}$                                                                         |                  |
| 6.5    | 1     | $\diamond$                                                                         |                  |
| Skupaj | 8     |                                                                                                                                                                       |                  |

| Naloga        | Točke    | Rešitev                                                                                                                                                                              | Dodatna navodila |
|---------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 7.1           | 1        | ♦ $v_{c,60(P20)} = 4080 \frac{\text{mm}}{\text{s}}$                                                                                                                                  |                  |
| 7.2           | 1        | ♦ $v_{c,60(P10)} = v_{c,60(P20)} \cdot 1,41$<br>$v_{c,60(P10)} = 4080 \frac{\text{mm}}{\text{s}} \cdot 1,41$<br>$v_{c,60(P10)} = 5753 \frac{\text{mm}}{\text{s}}$                    |                  |
| 7.3           | 1        | ♦ $A = a \cdot f = 1,5 \text{ mm} \cdot 0,1 \text{ mm}$<br>$A = 0,15 \text{ mm}^2$                                                                                                   |                  |
| 7.4           | 1        | ♦ $v_{c1} = \pi \cdot d \cdot n$<br>$n = \frac{v_{c1}}{\pi \cdot d} = \frac{345 \frac{\text{m}}{\text{min}}}{\pi \cdot 0,028 \text{ m}}$<br>$n = 3924 \frac{\text{vrt}}{\text{min}}$ |                  |
| <b>Skupaj</b> | <b>4</b> |                                                                                                                                                                                      |                  |

**Skupno število točk IP 2: 40**