



Š i f r a k a n d i d a t a :

Državni izpitni center



M 1 6 2 8 0 3 1 1

JESENSKI IZPITNI ROK

MATERIALI

≡≡≡ Izpitna pola 1 ≡≡≡

Osnovni modul

Sobota, 27. avgust 2016 / 90 minut

Dovoljeno gradivo in pripomočki:

Kandidat prinese naliveo pero ali kemični svinčnik, svinčnik, radirko, šilček, računalno in ravnilo.

Kandidat dobi dva konceptna lista in ocenjevalni obrazec.

SPLOŠNA MATURA

NAVODILA KANDIDATU

Pazljivo preberite ta navodila.

Ne odpirajte izpitne pole in ne začenjajte reševati nalog, dokler vam nadzorni učitelj tega ne dovoli.

Prilepite kodo oziroma vpišite svojo šifro (v okvirček desno zgoraj na tej strani in na ocenjevalni obrazec). Svojo šifro vpišite tudi na konceptna lista.

Izpitna pola vsebuje 10 strukturiranih nalog. Število točk, ki jih lahko dosežete, je 80. Za posamezno nalogo je število točk navedeno v izpitni poli.

Rešitve, ki jih pišite z nalivnim peresom ali s kemičnim svinčnikom, vpisujte **v izpitno polo** v za to predvideni prostor. Kadar je smiselno, narišite skico, čeprav je naloga ne zahteva, saj vam bo morda pomagala k pravilni rešitvi. Pišite čitljivo. Če se zmotite, napisano prečrtajte in rešitev zapišite na novo. Nečitljivi zapisi in nejasni popravki bodo ocenjeni z 0 točkami. Osnutki rešitev, ki jih lahko napišete na konceptna lista, se pri ocenjevanju ne upoštevajo.

Pri reševanju nalog mora biti jasno in korektno predstavljena pot do rezultata z vsemi vmesnimi računi in sklepi. Če ste nalogo reševali na več načinov, jasno označite, katero rešitev naj ocenjevalec oceni. Poleg računskih so možni tudi drugi odgovori (risba, besedilo, graf ...).

Zaupajte vase in v svoje zmožnosti. Želimo vam veliko uspeha.

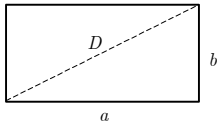
Ta pola ima 16 strani, od tega 1 prazno.



PERIODNI SISTEM ELEMENTOV

VIII
18

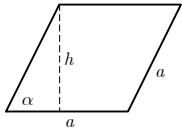
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**Liki**

$$A = ab$$

$$O = 2(a + b)$$

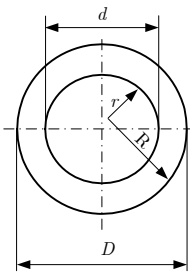
$$D = \sqrt{a^2 + b^2}$$



$$A = ah = a^2 \sin \alpha$$

$$h = a \sin \alpha$$

$$O = 4a$$



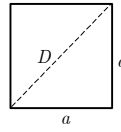
$$A = (R^2 - r^2)\pi = \frac{(D^2 - d^2)\pi}{4}$$

Zunanji obseg:

$$O = 2R\pi = D\pi$$

Skupni obseg:

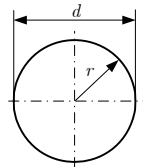
$$O = 2\pi(R + r) = \pi(D + d)$$



$$A = a^2$$

$$O = 4a$$

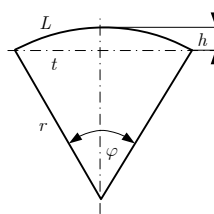
$$D = a\sqrt{2}$$



$$d = 2r$$

$$A = r^2 \pi = \frac{d^2 \pi}{4}$$

$$O = 2r\pi = d\pi$$

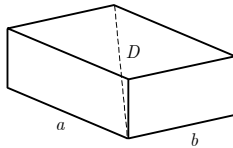


$$L = r\varphi$$

$$t = 2r \sin(\varphi/2)$$

$$h = r(1 - \cos(\varphi/2))$$

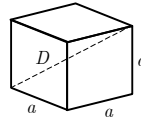
$$A = r^2 \varphi/2 = Lr/2$$

Telesa

$$V = abc$$

$$P = 2(ab + ac + bc)$$

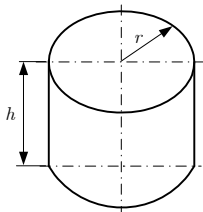
$$D = \sqrt{a^2 + b^2 + c^2}$$



$$V = a^3$$

$$P = 6a^2$$

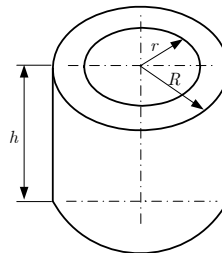
$$D = a\sqrt{3}$$



$$V = r^2 \pi h$$

$$P = 2\pi r(r + h)$$

Votli valj



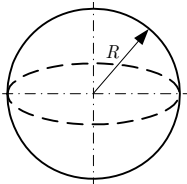
$$V = (R^2 - r^2)\pi h$$

Zunanja površina:

$$P = (R^2 - r^2 + 2Rh)\pi$$

Skupna površina:

$$P = 2\pi(R^2 - r^2 + (R + r)h)$$



$$V = 4\pi R^3/3$$

$$P = 4\pi R^2$$



1. naloga

1.1. Kako imenujemo manjše delce, iz katerih je zgrajen atom?

_____ (1 točka)

1.2. Nekateri manjši delci, iz katerih je sestavljen atom, imajo električni naboj, nekateri pa so električno nevtralni. Dopolnite spodnje trditve.

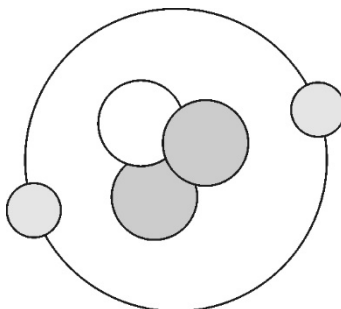
Električno nevtralni so _____.

Pozitivni električni naboj imajo _____.

Negativni električni naboj imajo _____ (1 točka)

1.3. Na sliki je električno nevtralen atom. Sestavljen je iz jedra in dveh elektronov. Jedro je sestavljeno iz treh delcev.

Označite delce s pozitivnim električnim nabojem z znakom **P**, negativno nabite delce z znakom **E** in električno nevtralne delce z znakom **N**.



(1 točka)

1.4. Kaj nam o zgradbi atoma pove atomsko (vrstno) število elementa?

Ugotovite, kakšno je atomsko (vrstno) število atoma na sliki pri 3. vprašanju te naloge, in iz periodnega sistema elementov ugotovite, za katero vrsto atoma (kateri kemični element) gre.

_____ (2 točki)



2. naloga

Med atomi in med molekulami delujejo privlačne sile, ki jih imenujemo kemične vezi. Poznamo več vrst kemičnih vezi. Mehanizem nastanka je odvisen od značilnosti atomov in molekul, ki se z njimi povezujejo.

2.1. Naštejte primarne kemične vezi.

(1 točka)

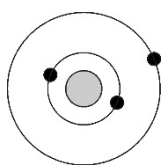
2.2. Katere kemične vezi še poznamo razen primarnih? Navedite primer.

(1 točka)

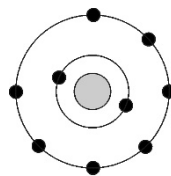
2.3. Opišite nastanek ionske vezi.

(2 točki)

2.4. Na sliki sta električno nevtralni atom litija in električno nevtralni atom fluora. S kakšno kemično vezjo se bosta povezala v spojino LiF (litijev fluorid)?



Litij (Li)



Fluor (F)

(1 točka)



3. naloga

- 3.1. V snoveh v trdnem agregatnem stanju so lahko atomi razporejeni po prostoru na različne načine. Lahko so razporejeni tako, da se vzorec periodično ponavlja na velikih razdaljah.

Kako imenujemo tako urejenost?

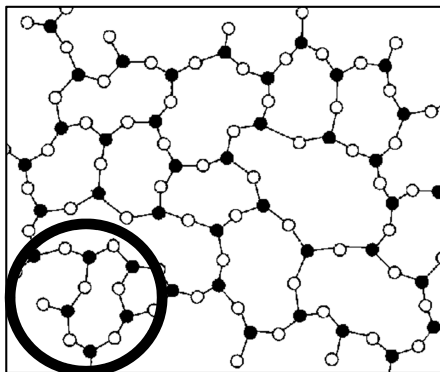
Kako imenujemo tako zgradbo (strukturo) snovi?

(2 točki)

- 3.2. Kakšna zgradba (struktura) je značilna za kovinske materiale?

(1 točka)

- 3.3. Na sliki je predstavljena ureditev atomov v nekem materialu.



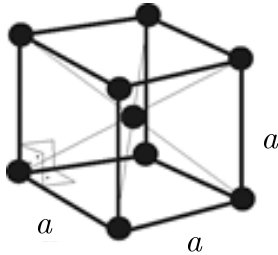
Je mogoče z opazovanjem razporeditve atomov, ki so na sliki znotraj kroga, ugotoviti, kako so razporejeni na območjih zunaj kroga?

Kako imenujemo tako razporeditev atomov v prostoru?

(2 točki)

**4. naloga**

Na sliki je osnovna celica kristalne mreže nekega materiala.



4.1. Kako imenujemo to vrsto kristalne mreže?

_____ (1 točka)

4.2. Koliko atomov v povprečju pripada eni taki osnovni celici mreže?

_____ (1 točka)

4.3. Razložite, kaj je polimorfizem.

_____ (1 točka)

4.4. Osnovna celica na sliki ima rob $a = 0,35 \cdot 10^{-9}$ m . Vsak atom tehta $9,8 \cdot 10^{-26}$ kg . Izračunajte gostoto materiala.

(2 točki)

**5. naloga**

5.1. Razložite pojma surovina in material.

(1 točka)

5.2. Ena od delitev materialov je delitev v tri velike osnovne skupine. Naštete vse tri.

(1 točka)

5.3. Primerjajte kovinske materiale in polimerne materiale.

(2 točki)

5.4. Katere od navedenih snovi prištevamo v skupino oksidne keramike?

HCl, CO₂, Al₂O₃, SiO₂, TiN, TiC, WC, VC, C₂H₅OH, ZrO₂.

V skupino oksidne keramike prištevamo: _____

(1 točka)

**6. naloga**

6.1. Polimerne materiale lahko delimo na naravne in umetne. Nekateri naravni polimerni materiali so zelo pomembni v gradbeništvu ali tekstilni industriji. Naštejte tri, ki so pomembni v gradbeništvu ali tekstilni industriji.

(1 točka)

6.2. Kaj je monomer?

(1 točka)

6.3. Kako nastanejo polimeri?

(1 točka)

6.4. Primerjajte lastnosti termoplastov in duroplastov.

(2 točki)



7. naloga

7.1. Opišite poglavitne razloge za propadanje lesa.

(1 točka)

7.2. Kako lahko pred korozijo zaščitimo kovinske materiale?

(2 točki)

7.3. Kakšni so vzroki za recikliranje in ponovno uporabo materialov?

(2 točki)

**8. naloga**

8.1. Kaj so mehanske lastnosti?

(1 točka)

8.2. Razložite pojem trdota.

(1 točka)

8.3. Opišite, kako ugotavljamo natezno trdnost.

(3 točke)



9. naloga

9.1. Kateri zakon opisuje linearno odvisnost deformacije od obremenitve?

_____ (2)

Zapišite ta zakon.

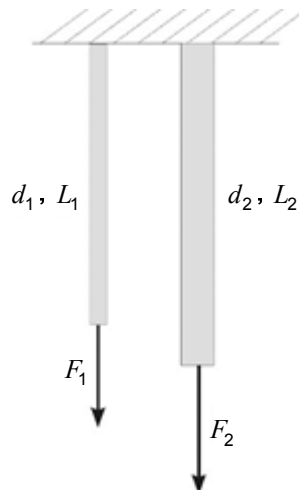
_____ (2)

Kakšne so deformacije v območju linearne odvisnosti od obremenitve? So plastične ali elastične?

_____ (2)
(6 točk)

9.2. Žici okroglega prereza imata premera $d_1 = 5$ mm in $d_2 = 6$ mm ter dolžini $L_1 = 1$ m in $L_2 = 1,2$ m. Youngov modul obeh žic je enak, 210 GPa. Žici obremenimo s silama $F_1 = 5$ kN in $F_2 = 8$ kN, zato se obe žici nekoliko podaljšata.

Izračunajte napetosti v obeh žicah.



(4 točke)



9.3. Kakšen bi moral biti premer d_2 , da bi bila relativna deformacija ε obeh žic enaka?

(5 točk)

9.4. Kakšna bi morala biti dolžina neobremenjene žice L_2 , da bi bili dolžini obeh obremenjenih žic enaki?

(5 točk)

**10. naloga**

Kratek standardni preizkušanec okroglega prereza za natezni preizkus je imel začetno merilno dolžino $L_0 = 100 \text{ mm}$ in začetni premer $d_0 = 20 \text{ mm}$.

Sile in raztezki, izmerjeni med nateznim preizkusom, so navedeni v spodnji preglednici.

F (kN)	ΔL (mm)	σ MPa	ε (%)
0	0		
50	0,05		
100	0,10		
150	0,15		
200	0,20		
250	0,25		
315	0,65		
350	1,20		
375	1,50		
388	2,00		
400	2,50		
388	3,20		
350	3,50		
275	3,75		

10.1. Izračunajte inženirske napetosti σ in relativne raztezke ε ter jih vpišite v preglednico.

(5 točk)



10.2. Narišite diagram relativnega raztezka v odvisnosti od inženirske napetosti (diagram $\sigma - \varepsilon$).

(5 točk)

10.3. Do katere obremenitve velja Hookov zakon?

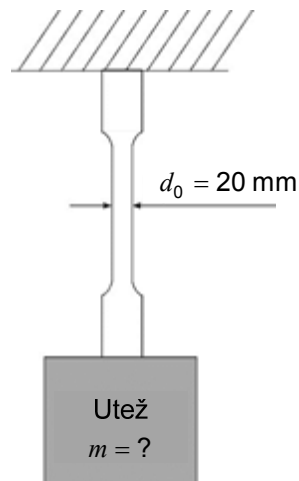
(3 točke)

10.4. Ugotovite natezno trdnost.

(3 točke)

10.5. Namesto s strojem za natezni preizkus bomo preizkušane okroglega prereza s premerom $d_0 = 20$ mm natezno obremenili z utežjo. Kakšna sme biti največja masa uteži, da se preizkušane ne bo pretrgal?

(4 točke)





Prazna stran