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|---|--|----|---|---|---|---|
| 1 | | 2 | 1 | 0 | 0 | 1 |
| 2 | | 3 | 1 | 0 | 2 | 0 |
| 3 | | 10 | 2 | 6 | 0 | 2 |
| 4 | | 6 | 2 | 0 | 2 | 2 |
| 5 | | 6 | 2 | 0 | 2 | 2 |

| | | | | | | |
|----|---|------------|-----------|-----------|-----------|--------------|
| 6 | | 6 | 2 | 0 | 2 | 2 |
| 7 | | 4 | 2 | 0 | 0 | 2 |
| 8 | - | 10 | 2 | 2 | 4 | 2 |
| 9 | - | 8 | 2 | 0 | 4 | 2 |
| 10 | | 4 | 2 | 0 | 0 | 2 |
| 11 | | 6 | 2 | 0 | 2 | 2 |
| 12 | | 10 | 2 | 2 | 4 | 2 |
| 13 | | 6 | 2 | 2 | 0 | 2 |
| 14 | | 10 | 2 | 2 | 4 | 2 |
| 15 | | 8 | 2 | 2 | 2 | 2 |
| 16 | | 8 | 2 | 0 | 4 | 2 |
| 17 | | 6 | 2 | 0 | 2 | 2 |
| 18 | - | 4 | 2 | 0 | 0 | 2 |
| 19 | | 27 | | | | 27 |
| | | 144 | 34 | 16 | 34 | 33+27 |

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- 1.
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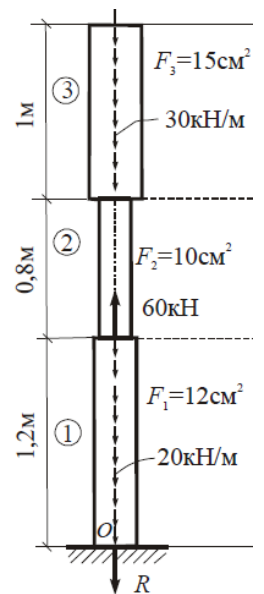
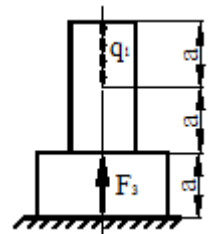
| c | | | $q_1=q_3,$ | $q_2,$ | $F_1,$ | $F_2,$ | $F_3,$ |
|----|---|-----|------------|--------|--------|--------|--------|
| 01 | 1 | 0,8 | 5 | 30 | 10 | 35 | 10 |

1.

5

2.

5



- 1.
- 2.

1.

50, 60, 70, 80,

- 1)
- 2)

M ;

$$M/D^3$$

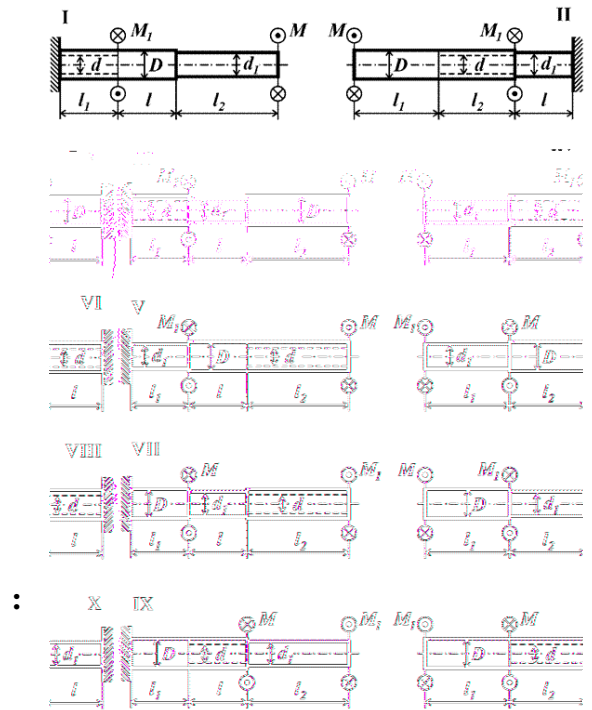
- 3)

$$M/GD^4$$

$$M/GD^4$$

| | | l_1/l | l_2/l | d/D | d_1/D | M_1/M |
|----|-----|---------|---------|-------|---------|---------|
| 01 | I | 1,0 | 3,0 | 0,90 | 0,95 | 1,5 |
| 02 | II | 2,0 | 1,0 | 0,80 | 0,85 | 2,0 |
| 03 | III | 3,0 | 1,0 | 0,60 | 0,65 | 1,5 |
| 04 | IV | 1,0 | 2,0 | 0,65 | 0,70 | 1,5 |
| 05 | V | 2,0 | 1,0 | 0,70 | 0,75 | 2,5 |
| 06 | VI | 3,0 | 1,0 | 0,75 | 0,80 | 1,5 |

$M=4,0$ $l=25$

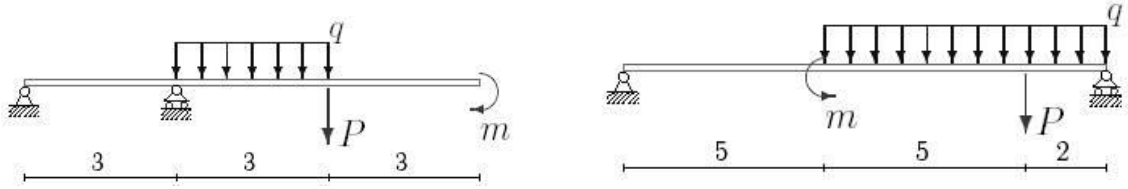


- 1.
- 2.

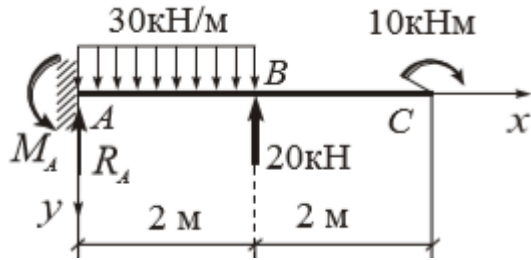
1.

3.

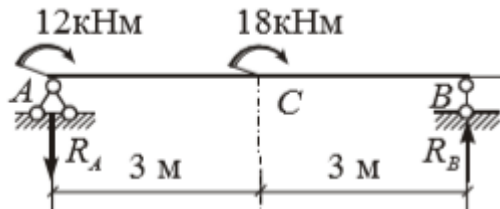
| c | | P, | m, | q, |
|----|---|----|----|----|
| 01 | 1 | 3 | 20 | 12 |
| 02 | 2 | 6 | 20 | 28 |



1.



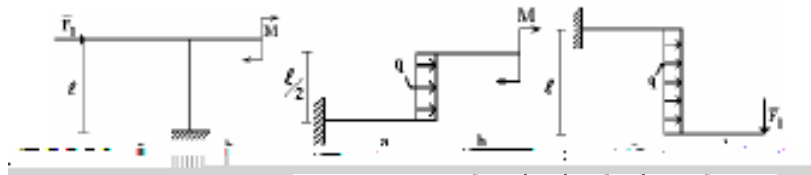
2.



1.

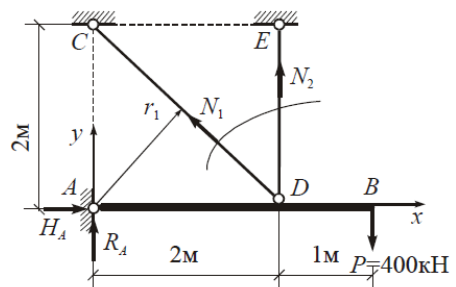
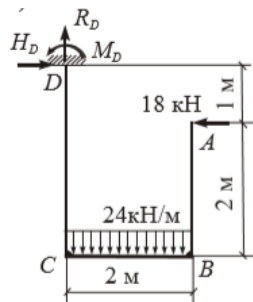
2.

1.

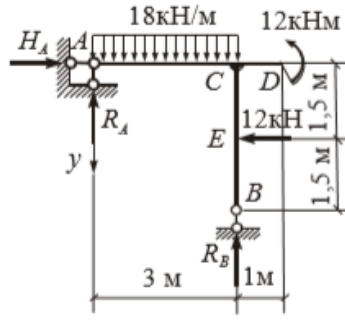


| Номер варианта по рис.1..5 | F_1 , кН | a , м | b , м | l , м | M , кНм | q , кН/м |
|----------------------------|------------|---------|---------|---------|-----------|------------|
| 1 | 12 | 1 | 2 | 2 | 24 | 5 |
| 2 | 10 | 2 | 2 | 3 | 16 | 4 |
| 3 | 12 | 3 | 2 | 4 | 12 | 6 |

1.

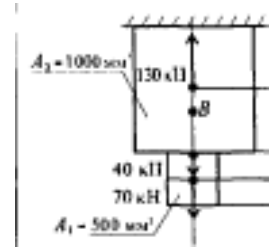


2.



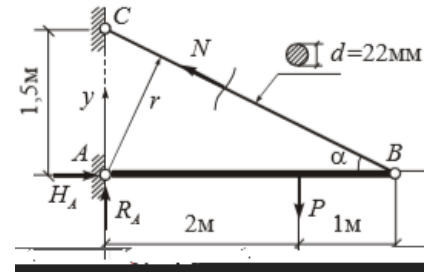
- 1.
- 2.
- 3.
- 1.

2.



5

1.



2 $\alpha = 1,2$.

- 1.
- 2.
- 1.
- 2.

3.

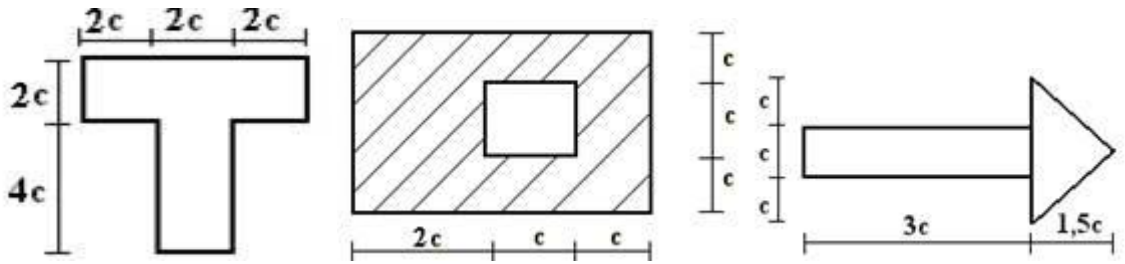
4.

5.

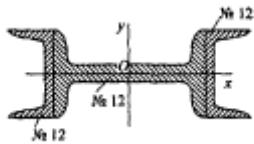
a)

b)

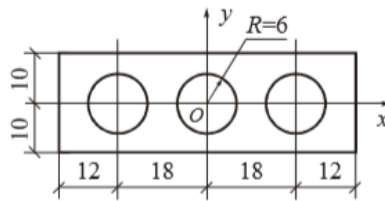
c)



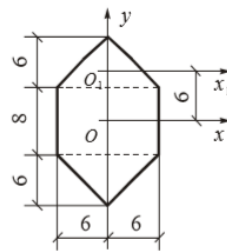
6.



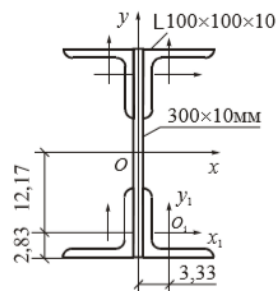
1.



2.

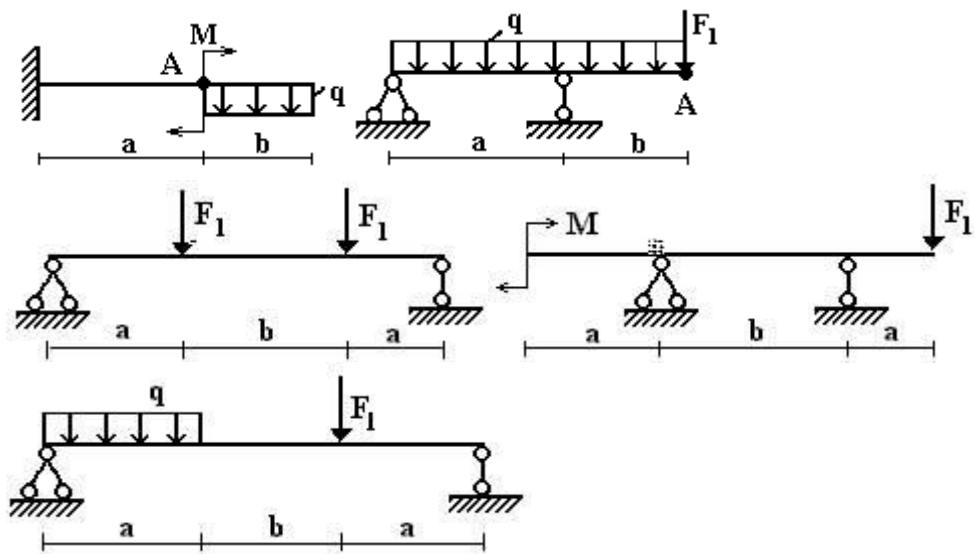


3.

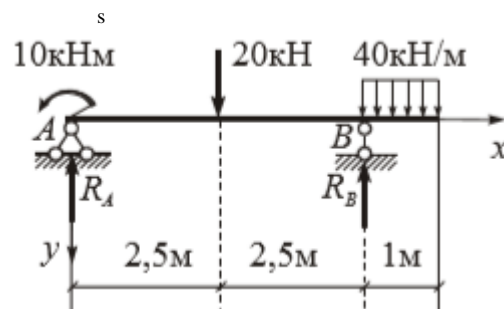


- 1.
- 2.

| c | | $F_{1,2}$ | b, | q, |
|----|---|-----------|-----|------|
| 01 | 1 | 12 | 1 2 | 24 5 |



- 1.



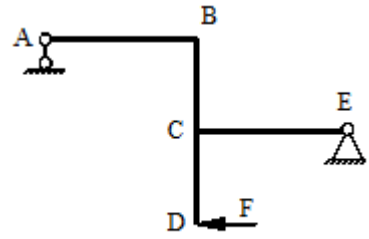
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- 2.

- 1.

Q N ;

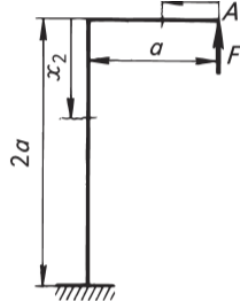
4)

| | | | | | |
|---|----|-------|-------|-------|---|
| | | F , | h , | l , | |
| c | 01 | 1 | 20 | 1 | 2 |
| | | | | | B |



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F, EJ .



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L_1 d_1

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F_{pr}
 F_s
 F_{max}

4.
5.

ℓ ℓ L_1 L
 ℓ_1 ℓ_0 ℓ .

6.
7.

F ℓ

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40?

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| F, | F, | -01 | | | | | | | |
|----|----|-----|---|---|---|---|---|---|---|
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| | | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| | - | | - | | - | | - | | - |
| | | | | | | | | | |

F
i T_i

$$\frac{T_1}{2} \frac{F}{A} T_{4cp} k.$$

$$\frac{T_2 T_{3cp}}{2} k.$$

k -6

-01.

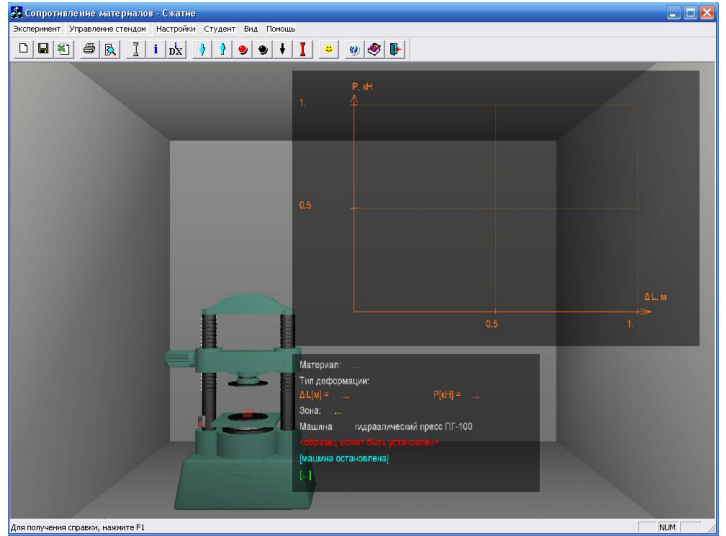
F T₁

$$E \text{ — } \dot{y}$$



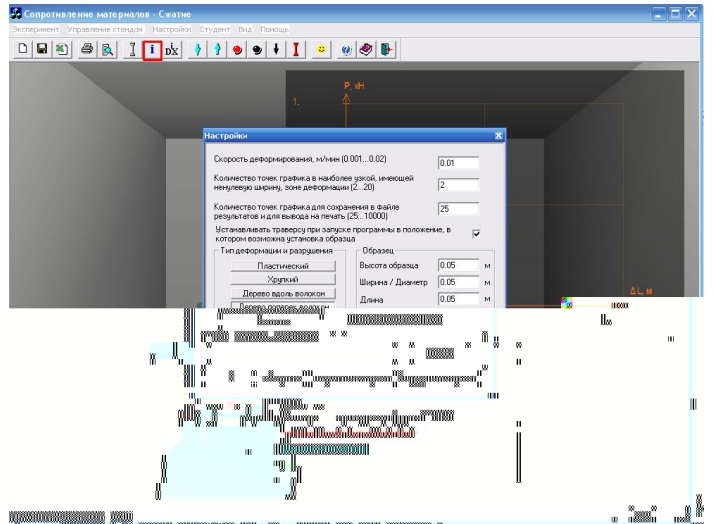
$$G \frac{E}{21}$$

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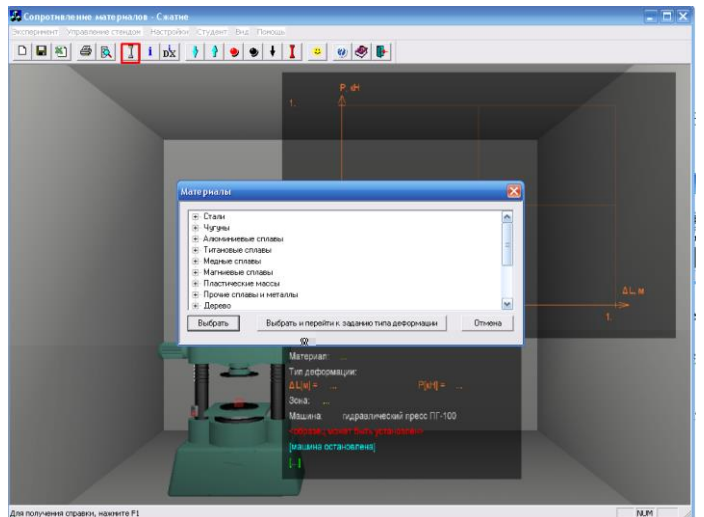


i

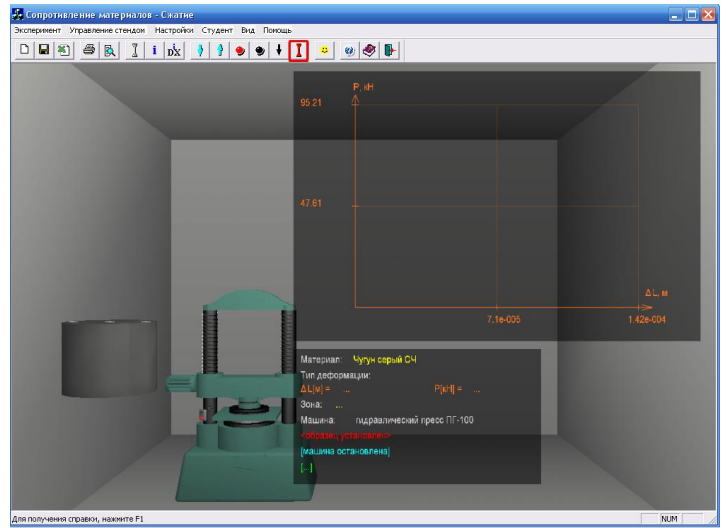
2.
(0.001- 0.02)



10000).



2.)



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| | | 1 | | 2 | | 3 | | 4 | | 5 |
| 0,5 | | | | | | | | | | |
| 1,0 | | | | | | | | | | |
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| | | | | | | | | | | |

- i

k $i=k$ i , (i=1, 2, 3)
-01.

z_i i

$$z_i = \frac{M_x}{J_x} y_i,$$

$$J_x = \frac{bh^3}{12} + \frac{b d h 2t^3}{12}$$

| | icp | i | z_i , | y_i , | z_i , |
|---|-----|---|---------|---------|---------|
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| 4 | | | | | |
| 5 | | | | | |

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35.

36.

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$$n_{C,cp} \quad C \quad n_{C,cp}$$

$$B \quad tg \quad B \quad \frac{n_{A,cp}}{a}$$

$$a=1/3-$$

5

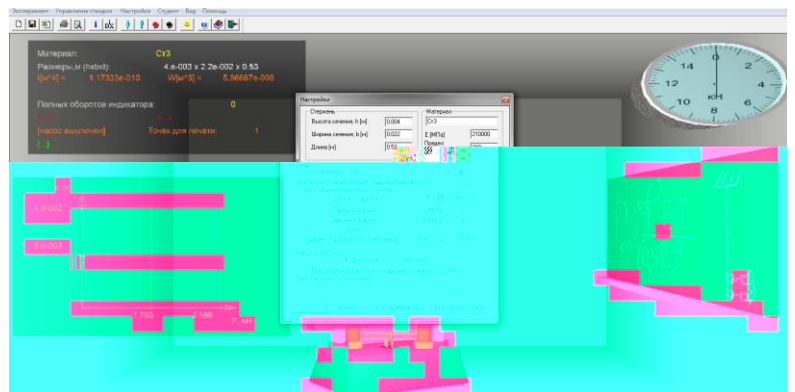
| | | | | | | | |
|----|----|--|--|--|--|--|--|
| F, | F, | | | | | | |
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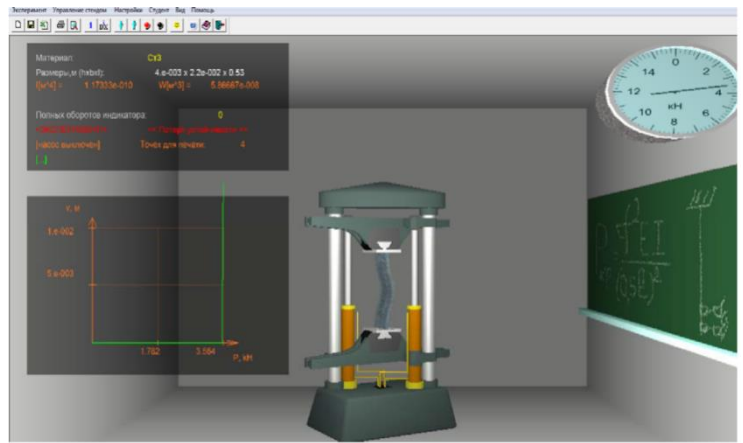
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- 3.





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- 20.
- 21.

cr

I_{min}?

i

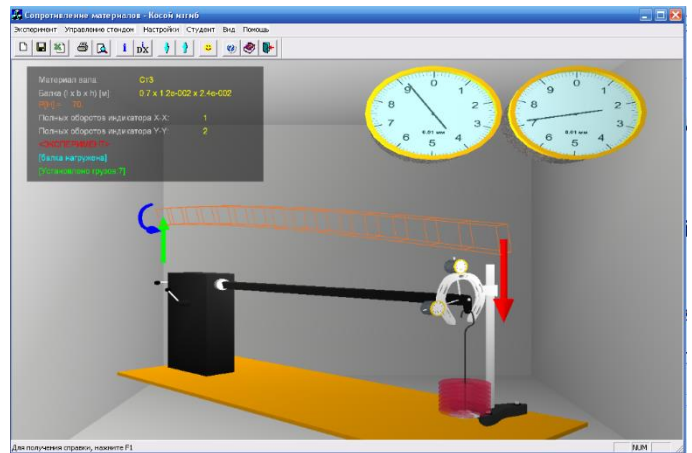
y

 T_x, T_y

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7.

G?

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Q?

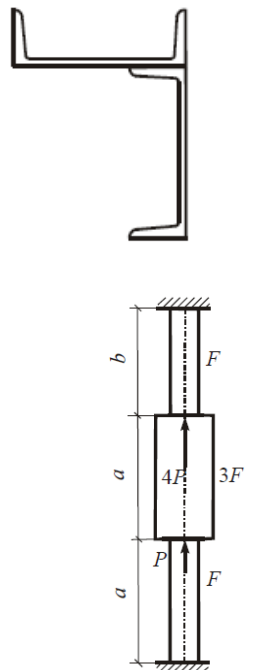
3.

2?

6.

 $b=30 \quad F \quad 2$

p



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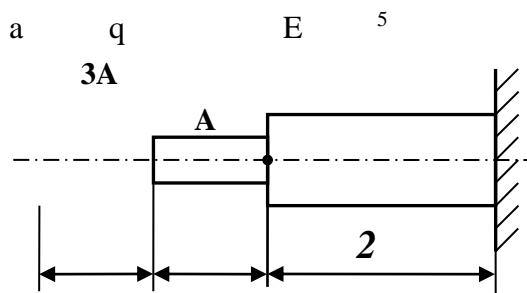
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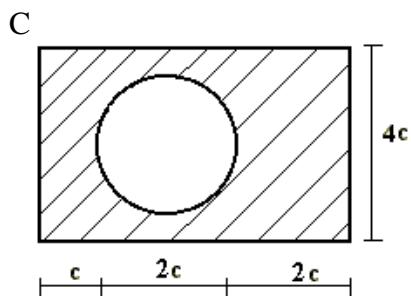
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- 50.
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A



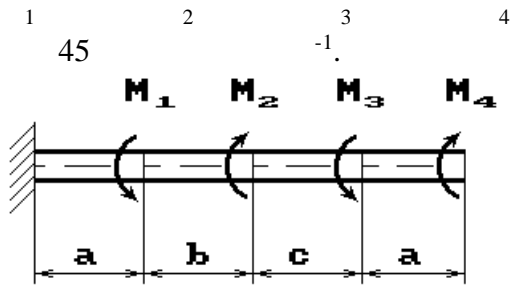
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1 2 3 4

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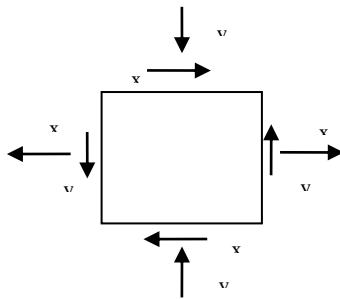
- 3.



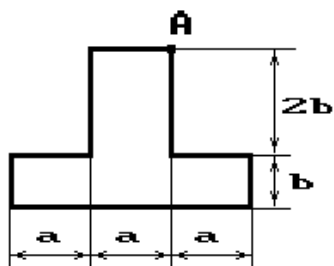
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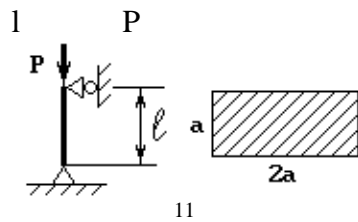
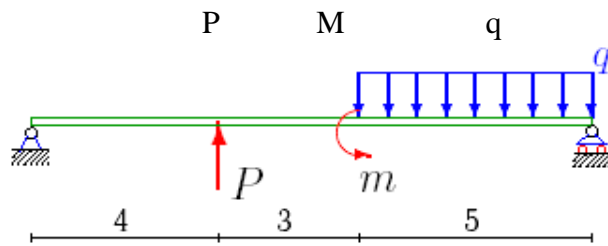
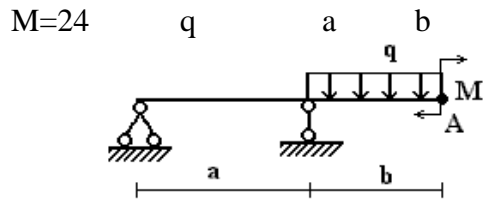
x y

$E=2 \cdot 10^{11}$ $\nu=0,3$.

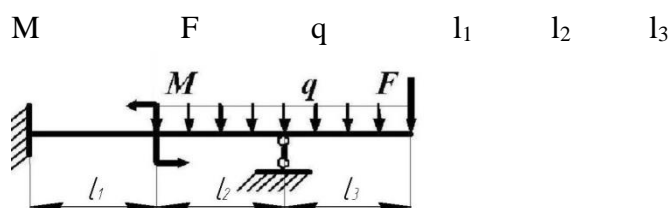


a b c c p

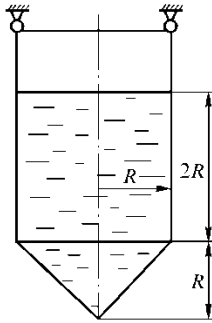




| | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| | 1,000 | 0,990 | 0,970 | 0,950 | 0,920 | 0,890 | 0,860 | 0,810 | 0,750 | 0,690 | 0,600 |
| | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 |
| | 0,450 | 0,400 | 0,360 | 0,320 | 0,290 | 0,260 | 0,230 | 0,210 | 0,190 | 0,170 | 0,160 |



IV



R

3

$p_0 = \rho g R$

$[\sigma] = 80$

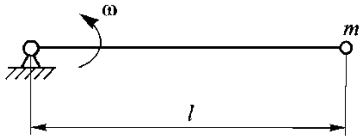
F

l

m

$\rho = 5 \quad l = 0,7$

$E = 2 \cdot 10^5$



H

m

d

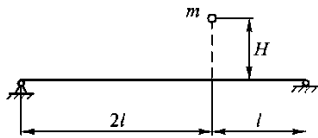
H

m

l

d

$E = 2 \cdot 10^5$



d

m

l

d=3

$E = 2 \cdot 10^5$

l

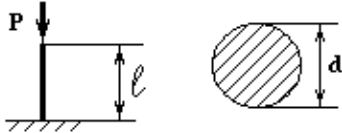
d

$P = 800$

$E = 2 \cdot 10^5$

a

b

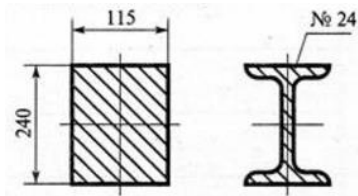


d

$M_{min} = -$

M_{max}

$K_{-1} = 1,77$



7

1.
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URL: <https://urait.ru/bcode/449819>.
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ISBN 978-5-534-09942-3.

URL: <https://urait.ru/bcode/453365>.

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2. <http://mysopromat.ru/>

3. <http://sopromato.ru/>

4. <http://www.isopromat.ru/sopromat>

Microsoft Open License (Windows XP, 7, 8, 10, Server, Office 2003-2016),
66975477 03.06.2016 ().

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