1

1.1 ( )

: ,
.

(.1.1)
(R) .

$$R = R_1 + R_2 + R_3 + R_4 = \sum R_i \qquad (1.1)$$

(.1.2),
(R)

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4} = q; \qquad R = \frac{1}{q} \qquad (1.2)$$

. . (q),
.

$(R_1 \quad R_2)$,

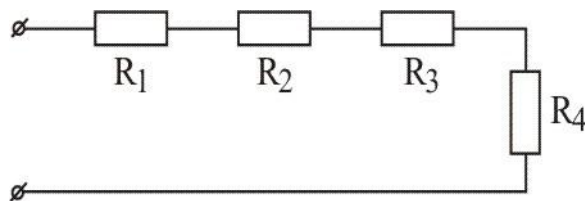$$R = \frac{R_1 \cdot R_2}{R_1 + R_2} \qquad (1.3)$$

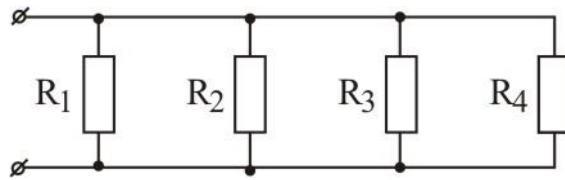$$R = \frac{R_1 \cdot R_2 \cdot R_3}{R_1 \cdot R_2 + R_2 \cdot R_3 + R_1 \cdot R_3} \qquad (1.4)$$
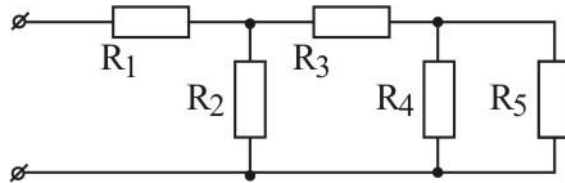
(n)
(R) , :

$$R = R/n \qquad (1.5)$$

1.1 –

1.2 –

1.3 –

(.1.3)

.   (R$_4$ R$_5$)

.   ,

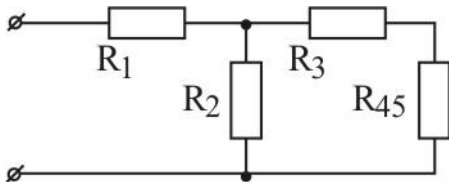(R$_{45}$),   (1.3).

(.1.4)

$$R_{45} = \frac{R_4 \cdot R_5}{R_4 + R_5}$$

1.4   1.5

(. 1.4)   ,   (R$_3$ R$_{45}$)

.   (R$_{345}$)

(1.1).
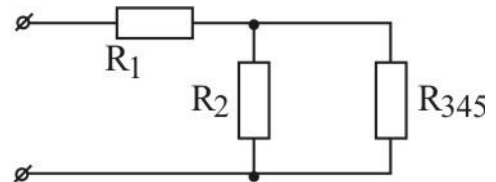
R$_{345}$ = R$_3$ + R$_{45}$

,

(R$_{2345}$)   (R)

$$R_{2345} = \frac{R_2 \cdot R_{345}}{R_2 + R_{345}}$$

1.1. (1.3)
$R_1=6$, $R_2=60$, $R_3=16$, $R_4=40$, $R_5=60$,
(R)

$$R_{45} = \frac{R_4 \cdot R_5}{R_4 + R_5} = \frac{40 \cdot 60}{40 + 60} = 24$$

$$R_{345} = R_3 + R_{45} = 16 + 24 = 40$$

:

$$R_{2345} = \frac{R_2 \cdot R_{345}}{R_2 + R_{345}} = \frac{60 \cdot 40}{60 + 40} = 24$$

$$R = R_1 + R_{2345} = 6 + 24 = 30$$

1 (1.1
).

1.2.

.

(R)

$$I = \frac{U}{R} \qquad\qquad (1.6)$$

,   R,
                                        U
        .

$$I = \frac{E}{R + r}, \qquad\qquad (1.7)$$

    E –   ,
    r –   ,
    R –   .

        .   ,
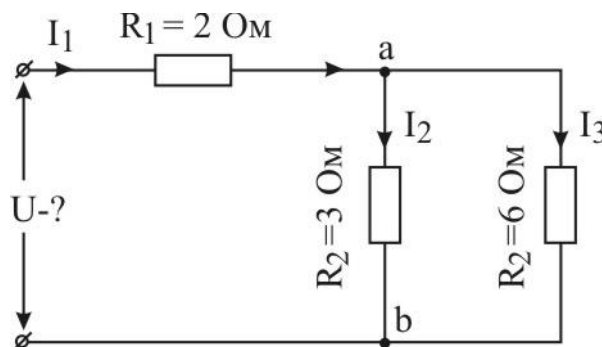,   .   :
                                                        , . .

$$\sum I_i = 0 \qquad\qquad\qquad\qquad (1.8)$$

.

.

$$\sum I_i \cdot R_i = \sum E_i \qquad\qquad\qquad (1.9)$$

, (R),

$$P = U \cdot I; \quad P = I^2 \cdot R; \quad P = \frac{U^2}{R} \qquad\qquad (1.10)$$

.

1.2. (.1.6.)
, (R$_2$), P=12 .
(I$_1$, I$_2$, I$_3$) (U).

I$_1$ R$_1$ = 2 Ом   a

I$_2$ I$_3$

R$_2$=3 Ом   R$_2$=6 Ом

U-?

b

1.6 –

:

(1.10), (a,
b)

$$Uab = \sqrt{P \cdot R2} = \sqrt{12 \cdot 3} = 6 \quad .$$

(1.6),

I$_2$, I$_3$:

$$I_2 = \frac{Uab}{R_2} = \frac{6}{3} = 2 \quad ; \qquad I_3 = \frac{Uab}{R_3} = \frac{6}{6} = 1 \quad ;$$

4

(I₁)   (1.8)

$$I_1 - I_2 - I_3 = 0; \qquad I_1 = I_2 + I_3 = 2 + 1 = 3 \text{ A}$$

(1.9),

(U)

$$U = I_1 \cdot R_1 + I_2 \cdot R_2 = 3 \cdot 2 + 2 \cdot 3 = 12$$

1

1.1

:

.

5

R2=3
R3=18
R4=9
R1=6
R5=18
R6=12
R7=12
R8=18
R9=3
R10=3

6

R2=3
R7=1
R1=6
R3=18
R4=9
R6=4
R8=12
R9=6
R11=3
R5=4
R10=2

7

R1=2
R3=2
R5=1
R2=4
R4=4
R6=3

8

R3=3
R6=8
R2=4
R7=8
R4=18
R5=9
R1=2
R8=2

8

9

R9=4
R10=4
R1=6
R4=4
R5=24
R6=12
R7=18
R8=9
R2=8
R3=8

10

R3=9
R5=24
R4=18
R6=12
R1=36
R2=36
R7=8
R8=8

11

R2=18
R1=2
R3=9
R4=8
R5=10
R6=10

12

R1=4
R2=4
R4=4
R5=8
R6=8
R7=8
R8=12
R9=6
R3=4

9

R1=2

R2=12 R3=12

R4=9 R5=9 R6=9

R7=3

(13)

R5=6

R1=4

R3=6 R4=6

R2=2

(14)

R1=2

R5=3

R6=3

R3=9 R4=18

R7=2

R8=2

R2=2

(15)

R5=9 R4=12 R3=9 R2=12 R1=9

R6=1

(16)

10

17

R2=2
R1=1
R3=3
R4=3
R7=0,6
R5=0,3 R6=0,1

18

R2=12
R6=6
R7=6
R1=9
R3=9
R5=18
R8=9
R10=4
R4=12
R9=14

19

R1=6
R2=6
R4=12
R5=12
R6=12
R7=9
R8=18
R3=6

20

R3=12
R7=18
R4=6
R8=9
R1=9
R2=9
R5=20
R6=20
R9=12
R10=6

11

R2=1 R7=3
R1=4 R4=12 R6=6 R8=18 R11=2
R3=6 R9=9
R5=2 R10=4

21

R3=1
R1=12 R2=12 R4=12 R5=9 R6=18
R8=2 R7=6

22

R3=18
R2=2 R6=12
R4=9 R7=6
R1=12 R5=8 R8=4

23

R1=1
R3=18
R2=18
R4=12 R5=12 R6=12 R7=4

24

12

25

R1=2
R2=24
R3=12
R5=10
R6=10
R7=10
R4=2

26

R1=1
R2=24
R3=12
R4=5
R5=6
R6=6
R7=10

27

R2=3
R6=2
R1=12
R3=6
R5=6
R7=6
R4=3
R8=12

28

R3=2
R4=2
R1=3
R2=6
R5=10
R8=4
R9=6
R10=12
R6=24
R7=12

13

1.2

     :

    .

R1=20 Ом

I1=3A

A   B

I2 -?

R2=20 Ом

C

R3=10 R4=20 R5=20

(1)

u - ?

I4 I5-?

I3-?

Iоб-?

Д

A   B

I1- ?   P3=24Вт

R1=2 Ом

(2)

R2=3 Ом   R3=6 Ом

u - ?

I2- ?   I3- ?

C

Iоб - ?

R1=1,5 Ом

(3)

R3=25 R4=50 R5=150

u - ?

I1-?   I2   I3=6A

R2=1,5 Ом

R1=0,5 Ом A **R3=0,6**
V1 показывает 24 В
R2=6
R4=4 **R5=6**
④
V
V1
A2
B
R6=0,5 Ом
A3

R1=3 Ом **R2=3 Ом** C
V1 V2
R3=9 Ом **R4=18 Ом**
⑤
u=24B
V2
A2 A3
A1
D

A
I1- ?
R1=6 Ом **R3=6 Ом**
R2=6 Ом **R4=6 Ом**
⑥
u - ?
I2=2A I3- ?
B

+
I1
R1=1 Ом I2- ? I3- ? I4- ? I5=3A
⑦
u - ?
R2=24 Ом **R3=12 Ом** **R4=6 Ом** **R5=8 Ом**
-

15

8

R1=10 Ом
R3=10Ом

u- ?
E- ?
r = 0,4 Ом

R2=20 Ом
R4=20 Ом
R5=20 Ом

a
b
c
d

9

R1=1 Ом
A1
a
R2=1,5 Ом
c
V
V1 показывает
6 В
V1
R3=2
A2
R4=1
R5=1
A3
A4
b
d

10

R1=1 Ом
A1
E- ?
r = 0,1
V1
V2
V3
R2=2
R3=3
R4=6
A2
A3
A4
I2
I3
I4=1A

11

R1=20 Ом
R3=9 Ом
A
B
C
D
I1 - ?
I2
I3 - ?
I4
R2=30 Ом
R4=18 Ом
R5=6 Ом
u =24В
Iоб- ?

16

R1=20 Ом
R3=9 Ом
A   B   C   D
R2=30 Ом
R4=18 Ом
u - ?
I2 - ?
Ucd=6В
R5=6 Ом

12

R1=9 Ом
R7=3 Ом
Iоб - ?
I1 - ?
I2 - ?
A
R3=12 Ом
R2=18 Ом
R6=18 Ом
V1
R8=6 Ом
u - ?
R4=12 Ом
V1=24В
R5=6
B

13

I1 - ?
R3=18
Iоб - ?
R1=20
R2=30
R4=9
R5=6 Ом
I2 - ?
u - ?
P5=96 Вт

14