O’ZBEKISTON RESPUBLIKASI OLIY VA O’RTA MAXSUS TA’LIM VAZIRLIGI

Jizzax davlat pedagogika instituti
Fizika o’qitish metodikasi kafedrasi

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Fizikadan rasmlarda tasvirlangan tarqatma materiallar

(E l e k t r)

O’quv uslubiy qo’llanma

Jizzax-2017

UDK
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A

A.Qodiriy nomidagi Jizzax davlat pedagogika institutining 2017 yil _____ dagi №____- sonli ilmiy kengash qaroriga asosan nashrga tavsiya etilgan.

Ushbu qo'llanma pedagogika institutining "fizika-astronomiya o'qitish metodikasi" mutaxassisliklari dasturi asosida yozilgan bo'lib, unda bakalavriat talabalarining Umumiy fizika (elektromagnetizm) fanidan bajarishlari lozim bo'lgan laboratoriya ishlari berilgan. Qo'llanma elektr va magnit hodisalariga oid 12 ta laboratoriya ishlarini o'z ichiga olgan.

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Kirish

Ushbu qo’llanmada taklif qilinayotgan rasmli topshiriqlar o’quvchilarda elektr zanjirlariga oid tushunishlarni va ularni yig’a olishlari, elektr asboblarini ko’rsatgan qiymatlarni o’qiy olishlari, elektromagnit qurilmalari hamda oddiy zanjirlarni tahlil qila olishlari, shu bilan birga elektr zanjirlariga asoslangan holda turli masalalarni hal qila olishlariga yordam berishdan iborat.

Ushbu qo’llanmadan foydalanish ko’rgazmali topshiriqlar uchun ajratilgan vaqtdan yutishga va turli jixozlar yetishmovchiligida juda ham qo’l keladi.

Sababi: ushbu qo’llanmadagi har bir rasmli topshiriqdan foydalanishda yechimida keltirilgan ma’lumotlardan o’quvchi va o’qituvchi tomonidan o’tkaziladigan tajribalarda foydalanish imkoniyati yaqqol keltirilgan.

Qo’llanma 16 ta rasmli topshiriqni o’z ichiga olib, har bir topshiriq to’rtta variant ko’rinishida berilgan. Har bir variant esa bir necha topshiriqni o’z ichiga oladi. Bu topshiriqlar darslikdagi elektr bo’limiga ta’luqli turli bob va mavzularga tegishlidir.

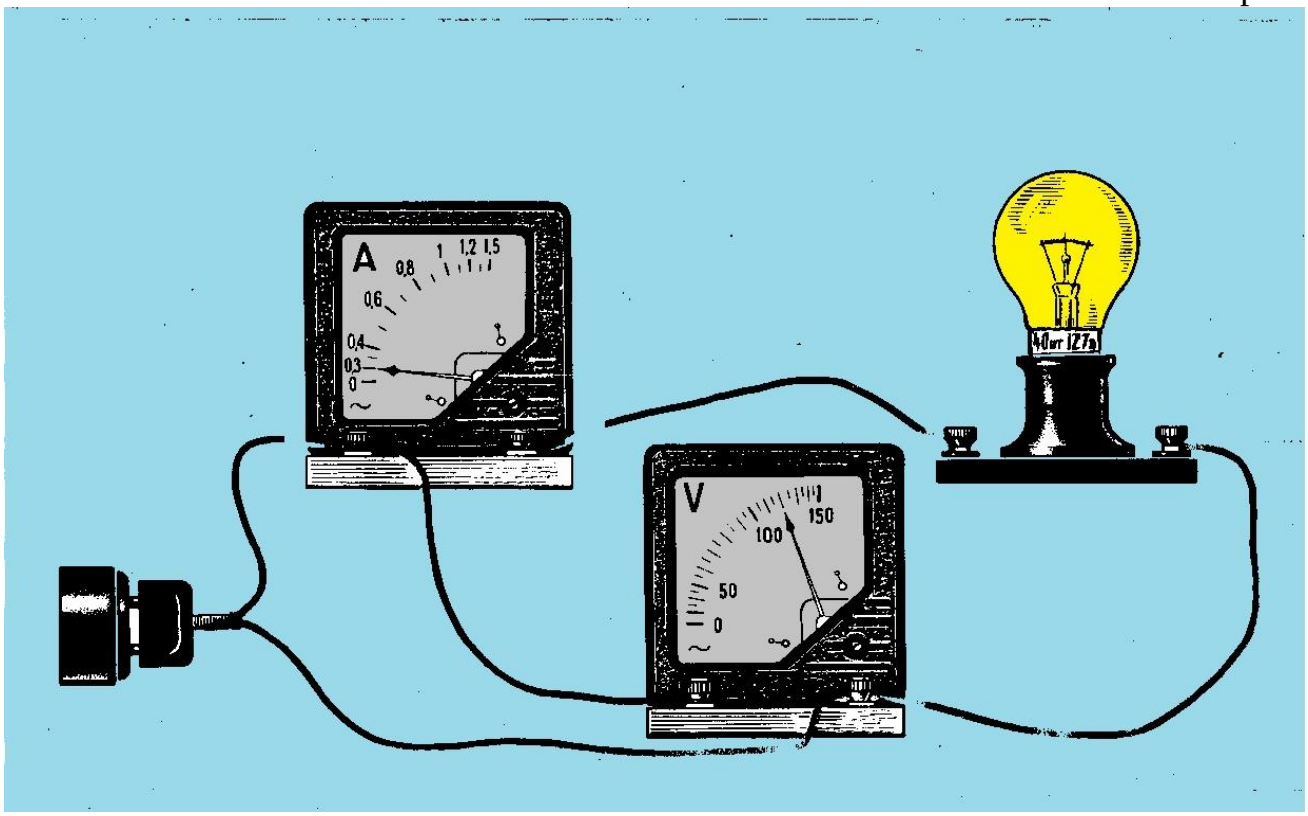
Shuning uchun rasmli topshiriqlardan foydalanganda o’tilayotgan mavzularga tegishli variantlarni yechish maqsadga muvofiq.

Qo’llanmada maktab darsligida berilgan mavzulardan tashqari mustaqil ishlashlari uchun ham o’rta qiyinchilikka ega bo’lgan topshiriqlar o’rin egallagan.

Ushbu qo’llanmadagi rasmli topshiriqlarni o’quvchilarga mustaqil yechishlari uchun uy vazifasiga qo’shimcha topshiriq sifatida har bir o’quvchiga bitta variantdan navbatma – navbat berib yuborish imkoniyatiga ega, bu bilan o’quvchilarda elektr hodisalariga oid tushuncha, ko’nikma va malakalarini shakllantirishda katta ahamiyatga ega bo’lishi mumkin.

Oquvchilarning mustaqil ishlashlari uchun qo’llanma yaratish borasida dastlabki urinish bo’lgani uchun u kamchiliklardan holi emas deb hisoblaymiz.

Qo’llanmani yaxshilashga qaratilgan takliflarni samimiyat bilan qabul qilamiz.

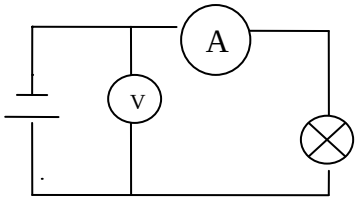


1a rasm

1. Rasmdagi elektr zanjirining prinsipial sxemasini chizing.
2. Lampa qisqichlaridagi kuchlanishni aniqlang.
3. Lampaning qarshiligini toping.
4. Lampaning quvvatini toping.
5. Lampa kuyib qolsa voltmeter qanday kuchlanishni ko'rsatadi?

1-a rasmning yechimi

1.

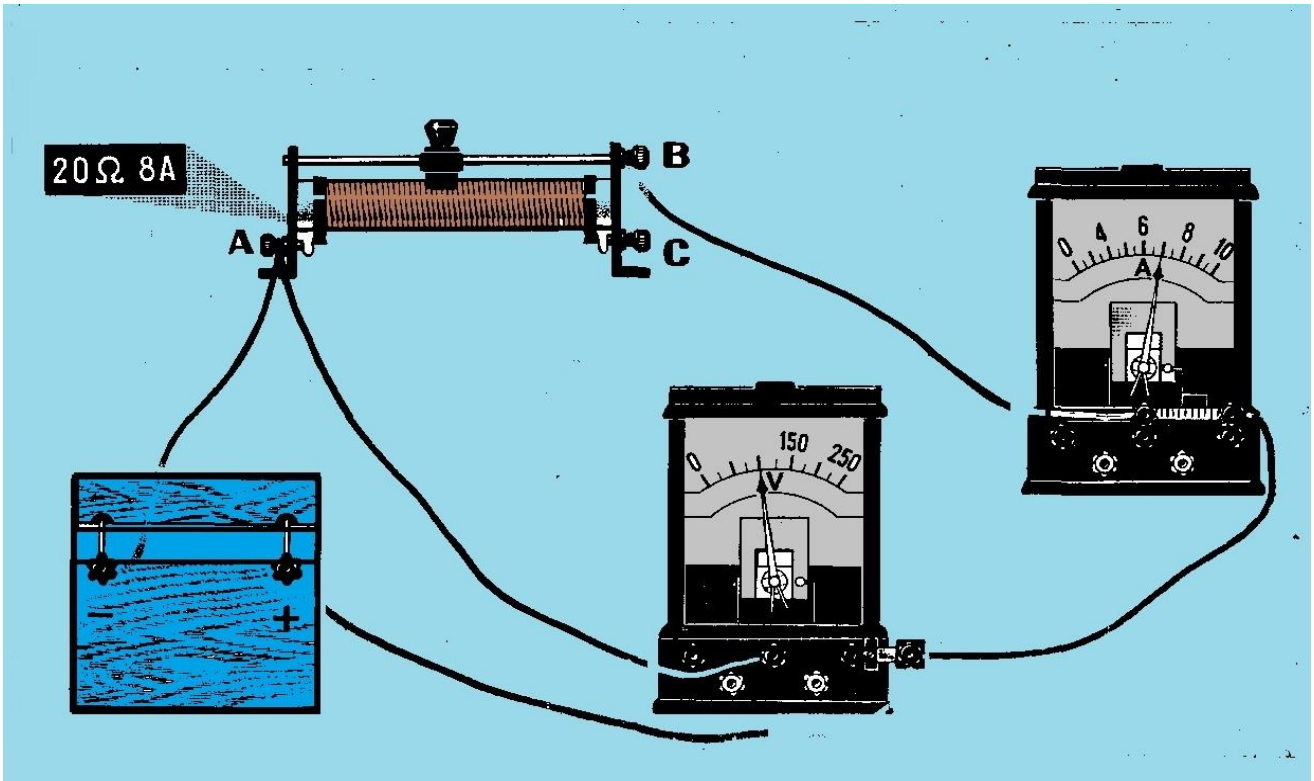


2. Lampa qarshiligiga nisbatan ampermetr ichki qarshiligini hisobga olmas darajada kichikligidan ampermetrdagi kuchlanish tushuvini 0 ga teng deb olish mumkun. U holda voltmetr lampadagi kuchlanishni ko'rsatadi, ya'ni, U_L = 120 V.

3. $R_L = \frac{U_L}{I} = \frac{120V}{0.3A} = 400\Omega$

4. P = 120 V 0,3 A = 36 Vt.

5. Voltmetr ko'rsatishi oshadi, ammo lampa kichik quvvatli bo'lgani uchun bu kam seziladi.

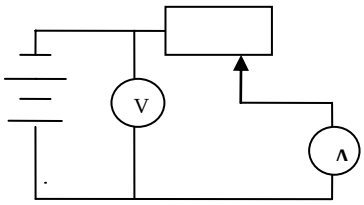


1b rasm

1. Rasmdagi elektr zanjirning prinspial sxemasini chizing.
2. Reostat qisqichlaridagi kuchlanishni toping.
3. Reostatning kuchlanish ostidagi qismini qarshiligini toping.
4. Reostatning kuchlanish ostidagi qismini quvvatini toping.
5. Agar o'tkazgichlar reostatning AB qisqichlaridan uzib, AC qisqichlarga ulansa, voltmeter ko'rsatishi qanday o'zgaradi? Buni qanday tushuntirish mumkin?

1-b rasmning yechimi

1.



2. Reostatning ulangan qismiga nisbatan ampermetrning ichki qarshiligi hisobga olmas darajada kichik bo'lganligidan ampermetrdagi kuchlanish tushuvini 0 ga teng deb olish mumkun. U holda voltmeter reostat qisqichlaridagi kuchlanishni ko'rsatadi, ya'ni, UR = 100 V.

3. Reostatning ulangan qismini qarshiligi Om qonuniga binoan topiladi:

$$R = \frac{U}{I} = \frac{100V}{7A} = 14{,}3\ \Omega.$$

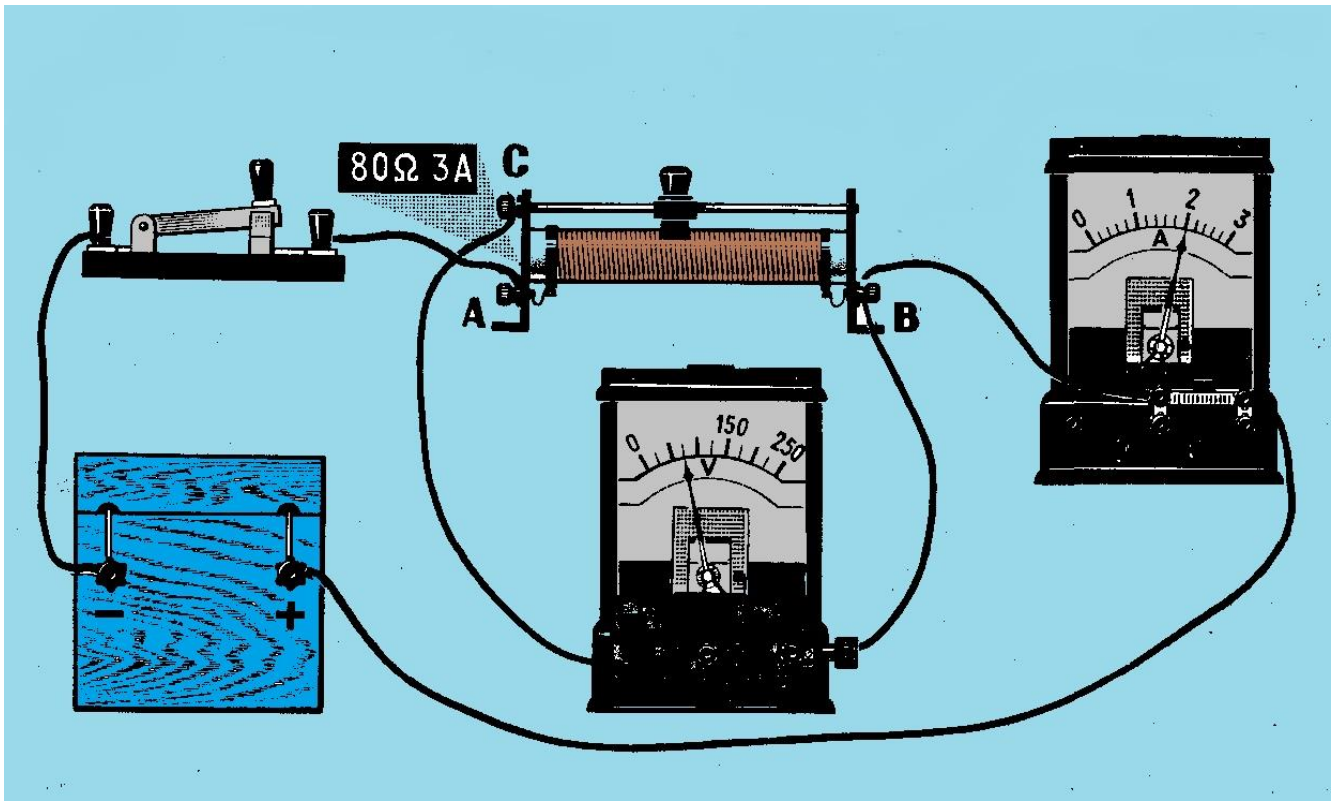
4. Reostatning ulangan qismidagi quvvat asboblarning ko'rsatishi asosida topiladi:

P = I U = 100 V 7 A = 700 Vt.

5. Voltmetr reostatning AC qisqichlariga ulanganda uning ko'rsatishi ikkita sababga ko'ra kamayadi:

a) U zanjirning kam qarshilikli qismidagi kuchlanishni o'lchaydi. (Bunda ampermetrdagi kuchlanish tushuvi hisobga olinmaydi)

b) Voltmetr bilan ketma – ket reostat surgichi va c qisqich orasidagi qarshiligi ham qo'shiladi.

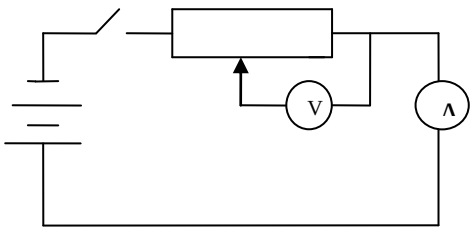


1c rasm

1. Rasmdagi elektr zanjirining prinspial sxemasini chizing.
2. Reostatning BC qisqichlari orasidagi qarshiligini toping.
3. Agar voltmetrni reostatning AB qisqichlariga ulansa, uning ko'rinishi qanday o'zgaradi? Shu kuchlanishni aniqlang.
4. Reostat quvvatini toping.
5. Agar reostat surgichini o'ngga sursak, voltmeter ko'rsatishi qanday o'zgaradi?

1-c rasmning yechimi

1.



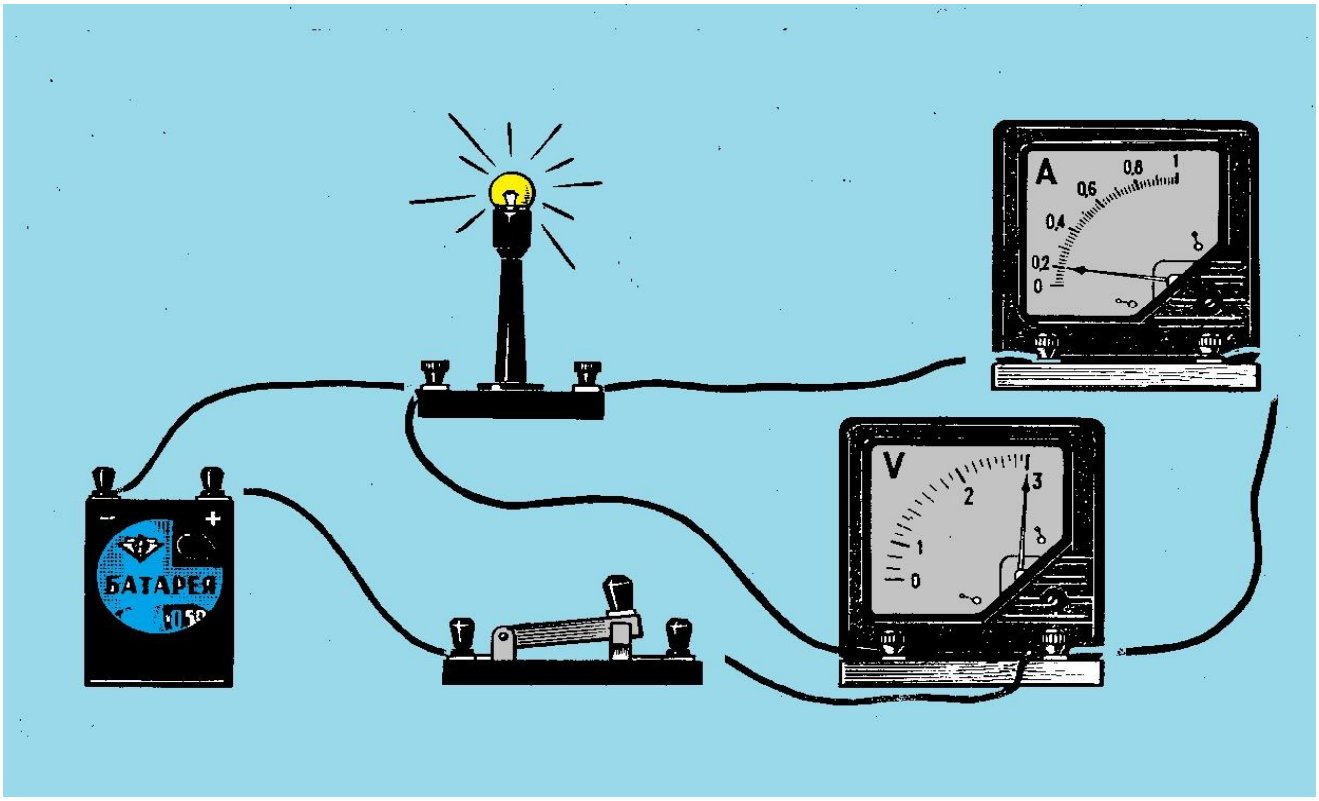
2. $R_{BC} = \frac{U}{I} = \frac{75V}{2A} = 35.5\Omega$

3. Voltmetr ko’rsatishi oshadi, chunki u katta qarshilikdagi kuchlanishni o’lchaydi. Voltmetr ko’rsatishini quyidagicha aniqlash mumkin:

$U_v = R_r\ I = 80\Omega\ 2A = 160$ V.

4. P = I U = 2 A 75 V = 150 Vt.

5. Voltmetr kichik qiymatni ko’rsatadi, chunki u kichik qarshilikdagi kuchlanishni o’lchaydi.

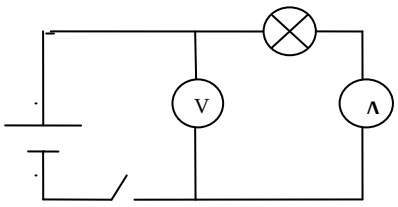


1d rasm

1. Rasmdagi elektr zanjirining prinspial sxemasini chizing.
2. Lampaning qarshiligini toping.
3. Tok manbai qisqichlaridagi kuchlanishni toping.
4. Lampaning quvvatini toping.
5. Agar lampa kuyib qolsa, voltmeter ko’rsatishi qanday o’zgaradi?

1-d rasmning yechimi

1.



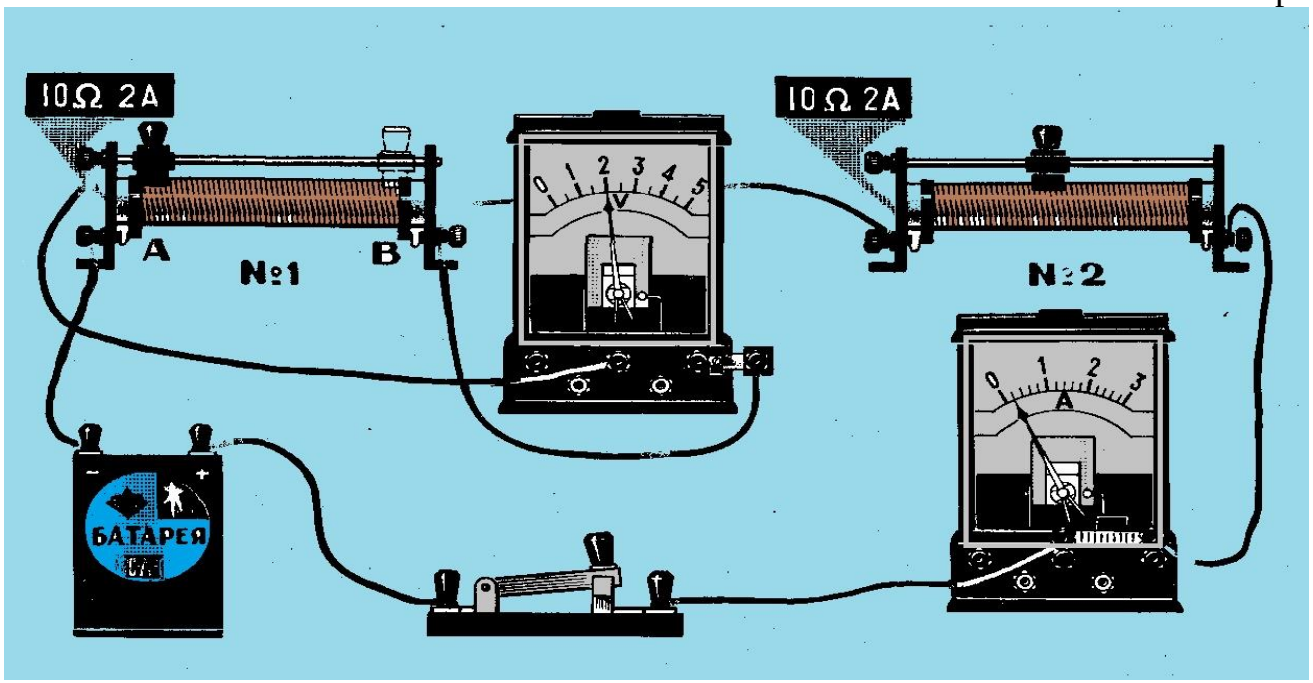
2. $R_L = \frac{U_L}{I} = \frac{3V}{0.2A} = 15\Omega$.

3. $U_m = 3$ V.

4. $P_L = U_L\ I = 3$ V 0,2 A = 0,6 Vt.

5. Voltmetr ko’rsatishi oshadi.

2-topshiriq

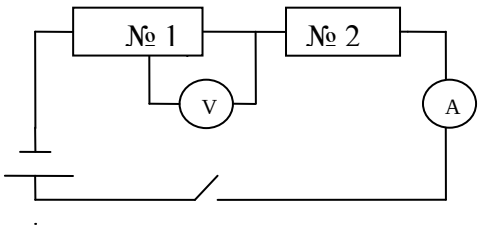


2a rasm

1. Rasmdagi elektr zanjirining prinsipial sxemasini chizing.
2. № 2 reostatning quvvatini toping.
3. Agar № 1 reostatning surgichini A nuqtadan B nuqtaga sursak, kuchlanish qanday oraliqda o'zgaradi?
4. Zanjirning faktik quvvatini toping.
5. № 2 reostatdagi kuchlanishni toping.
6. Butun zanjirni nominal qiymatini toping.

2–a rasmning yechimi

1.



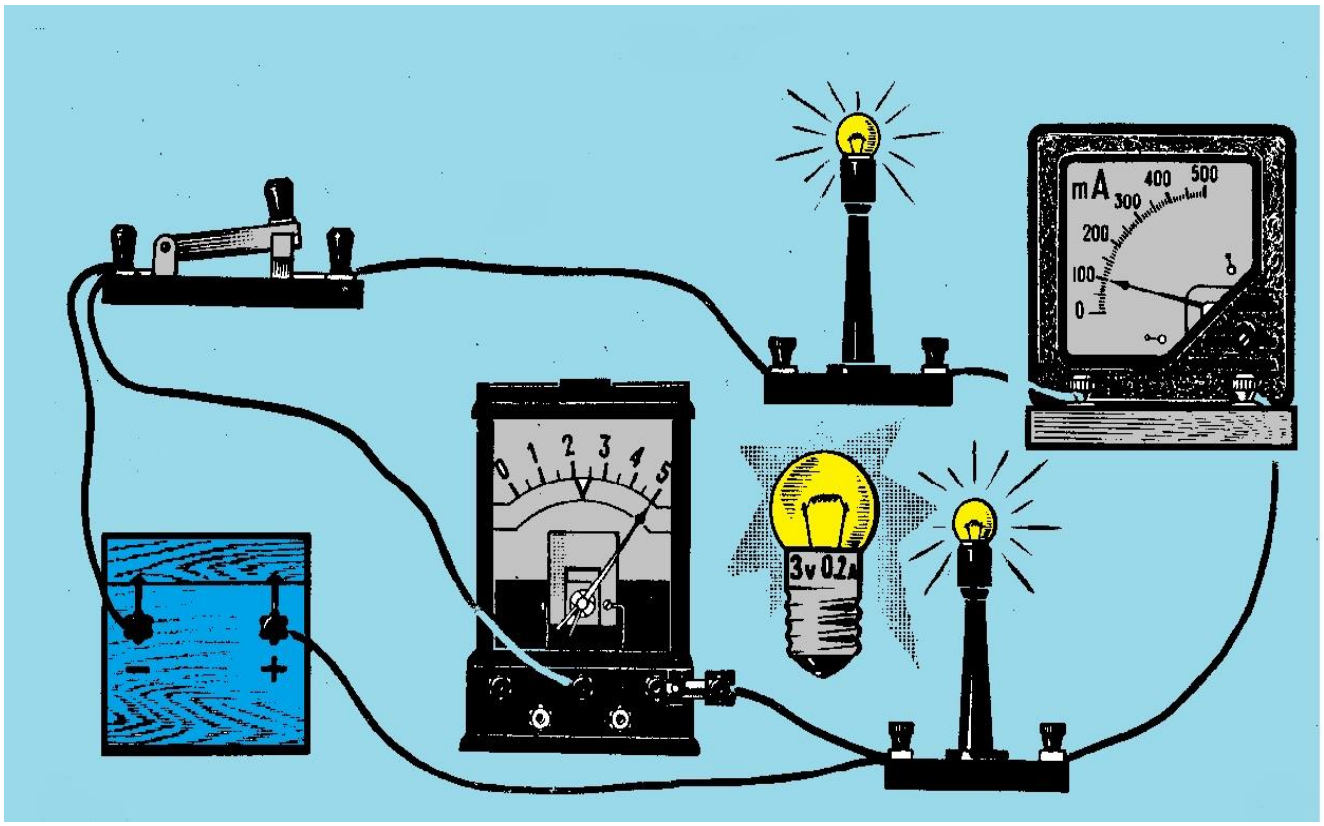
2 $P = I^2 R = (0{,}2\ A)^2\ 10\Omega = 0{,}4\ Vt.$

3. Kuchlanish 2 V dan 0 V gacha o'zgaradi.

4. $P_Z = I^2 R_1 + I^2 R_2 = (0{,}2\ A)^2\ 10\ \Omega + (0{,}2\ A)^2 10\Omega = 0{,}8\ Vt.$

5. $U_2 = I\ R_2 = 0{,}2\ A\ 10\ \Omega = 2\ V.$

6. $P = I^2\ R_1 + I^2 R_2 = (2\ A)^2 10\ \Omega + (2\ A)^2\ 10\ \Omega = 80\ Vt.$

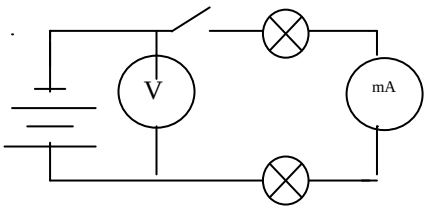


2 b rasm

1. Rasmdagi elektr zanjirning prinspial sxemasini chizing.
2. Bitta lampadagi kuchlanishni toping.
3. Agar barcha lampalar bir xil bo’lsa, bitta lampaning qarshiligini toping.
4. Bitta lampa kuyib qolsa, voltmetr ko’rsatishi qanday o’zgaradi?
5. Butun zanjirning faktik qarshiligini toping.
6. Butun zanjirning nominal quvvatini toping.

2–b rasmning yechimi

1.



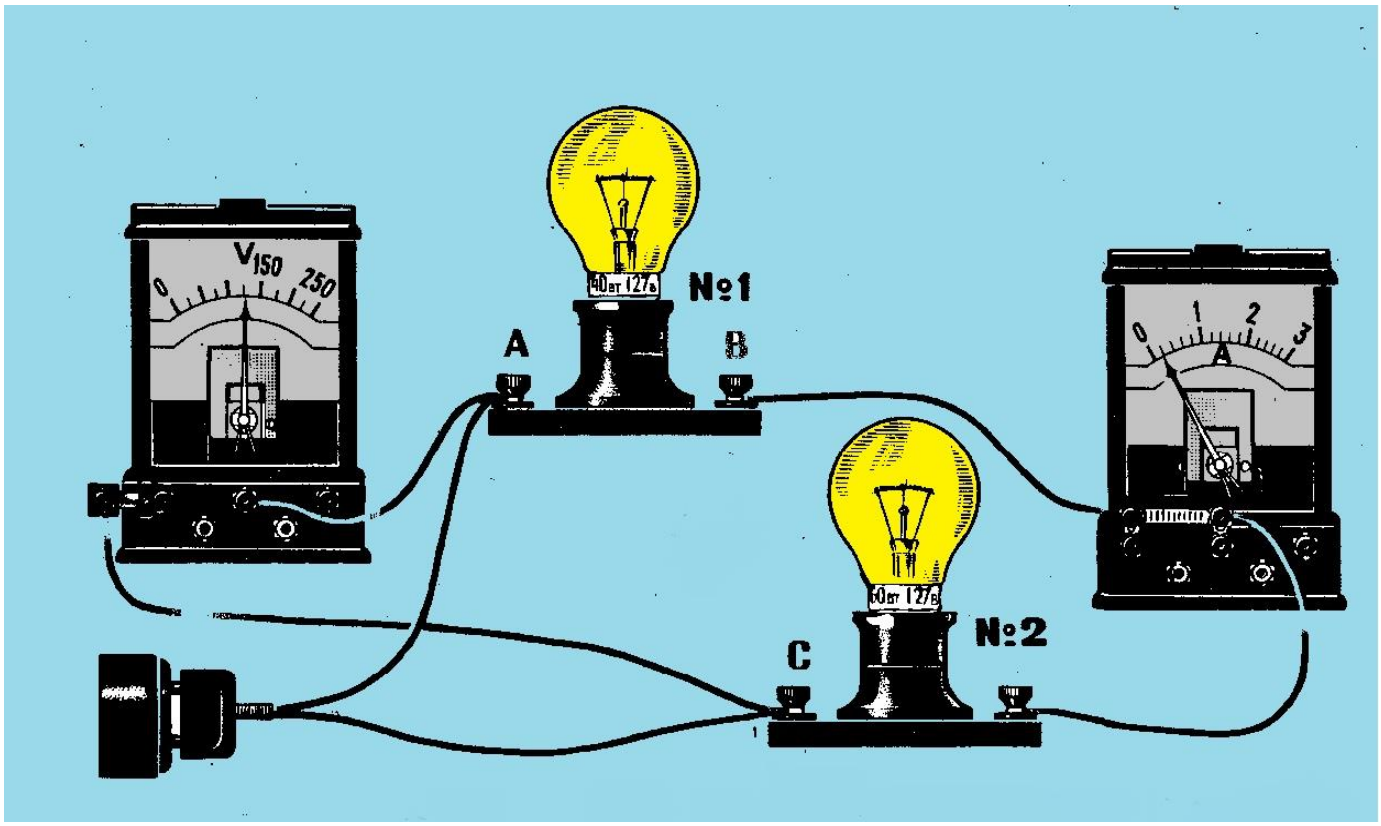
2. $U_L = \frac{5V}{2} = 2{,}5$ V.

3. $R_L = \frac{U_L}{I} = \frac{2.5V}{0.1A} = 25\ \Omega$

4. Voltmetr ko’rsatishi oshadi.

5. P = I U = 5 V 0,1 A = 0,5 Vt.

6. P = 2 U_L I = 2 3 V 0,2 A = 1,2 Vt.

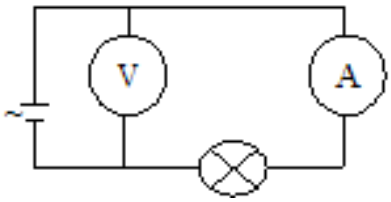


2 c rasm

1. Rasmdagi elektr zanjirning prinspial sxemasini chizing.
2. Agar lampa № 1 kuyib qolsa, voltmetr ko’rsatishi qanday o’zgaradi?
3. Butun zanjirning faktik quvvatini aniqlang.
4. № 1 lampaning nominal qarshiligini aniqlang.
5. № 1 lampadagi kuchlanishni aniqlang.
6. Qaysi lampa ravshanroq yonadi? Nimaga?

2– c rasmning yechimi

1.



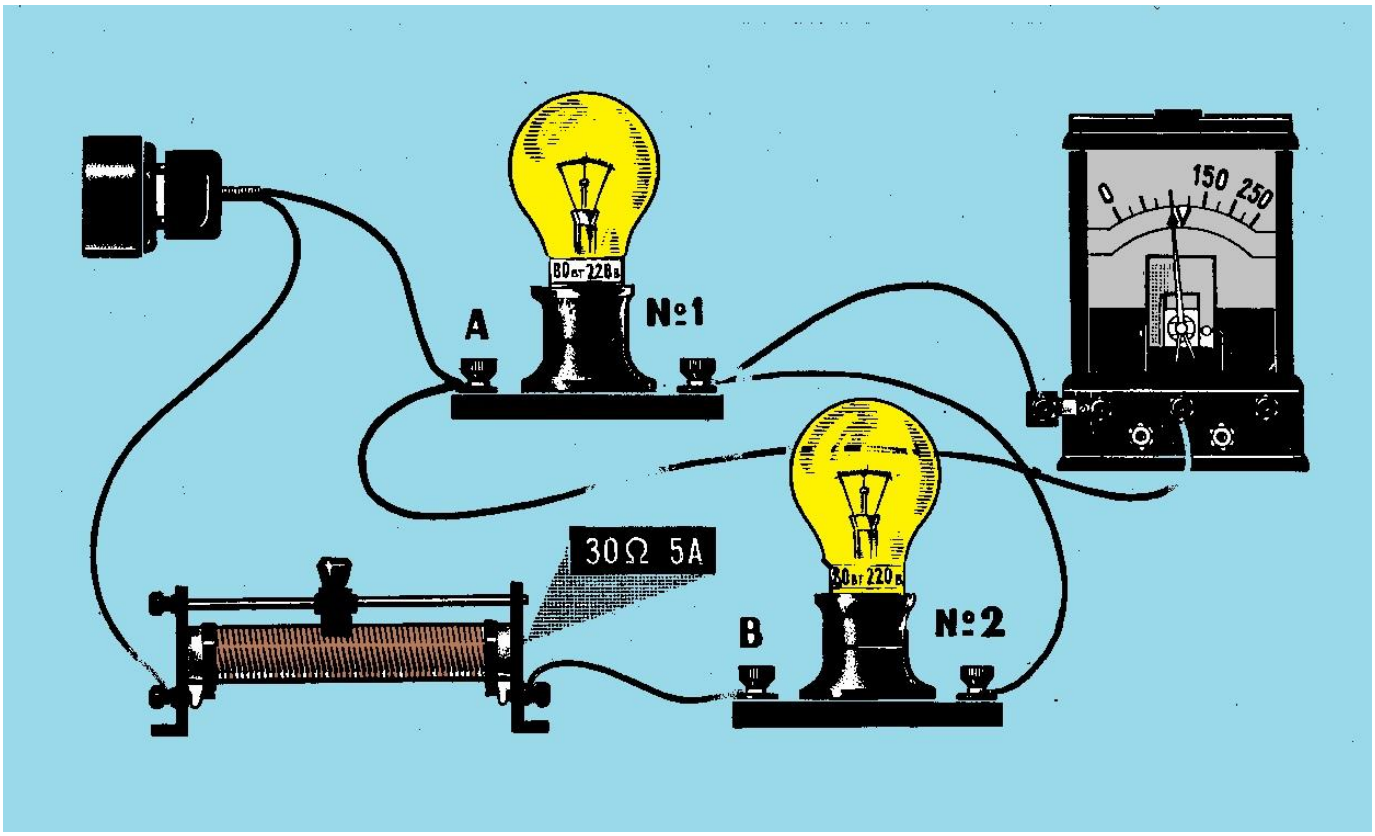
2. Voltmetr ko’rsatishi oz miqdorda oshadi.

3. P = I U = 125 V 0,2 A = 25 Vt.

4. $R_L = \frac{U^2}{P} = \frac{(127V)^2}{40Vt} =$ 403 Ω.

5. U_{L1} = 0,2 A 403Ω = 80,6 V.

6. № 1 lampaning qarshiligi katta bo'lgani sababli unda kuchlanish tushuvi sodir bo'lib, u ravshanroq yonadi.

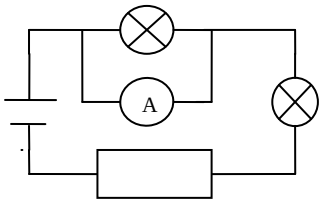


2 d rasm

1. Rasmdagi elektr zanjiriing prinsipial sxemasini chizing.
2. № 1 lampaning nominal qarshiligini toping.
3. Agar voltmetrni AB qisqichlarga ulasak, uning ko'rsatishi qanday o'zgaradi?
4. № 2 lampadagi nominal tokni aniqlang.
5. Agar № 1 lampa kuyib qolsa, voltmetr ko'rsatishi qanday o'zgaradi?
6. Zanjirdagi tok kattaligini aniqlang.

2- d rasmning yechimi

1.



2. $R_{L1} = \frac{U^2}{P} = \frac{(220V)^2}{80Vt} =$ 605Ω.

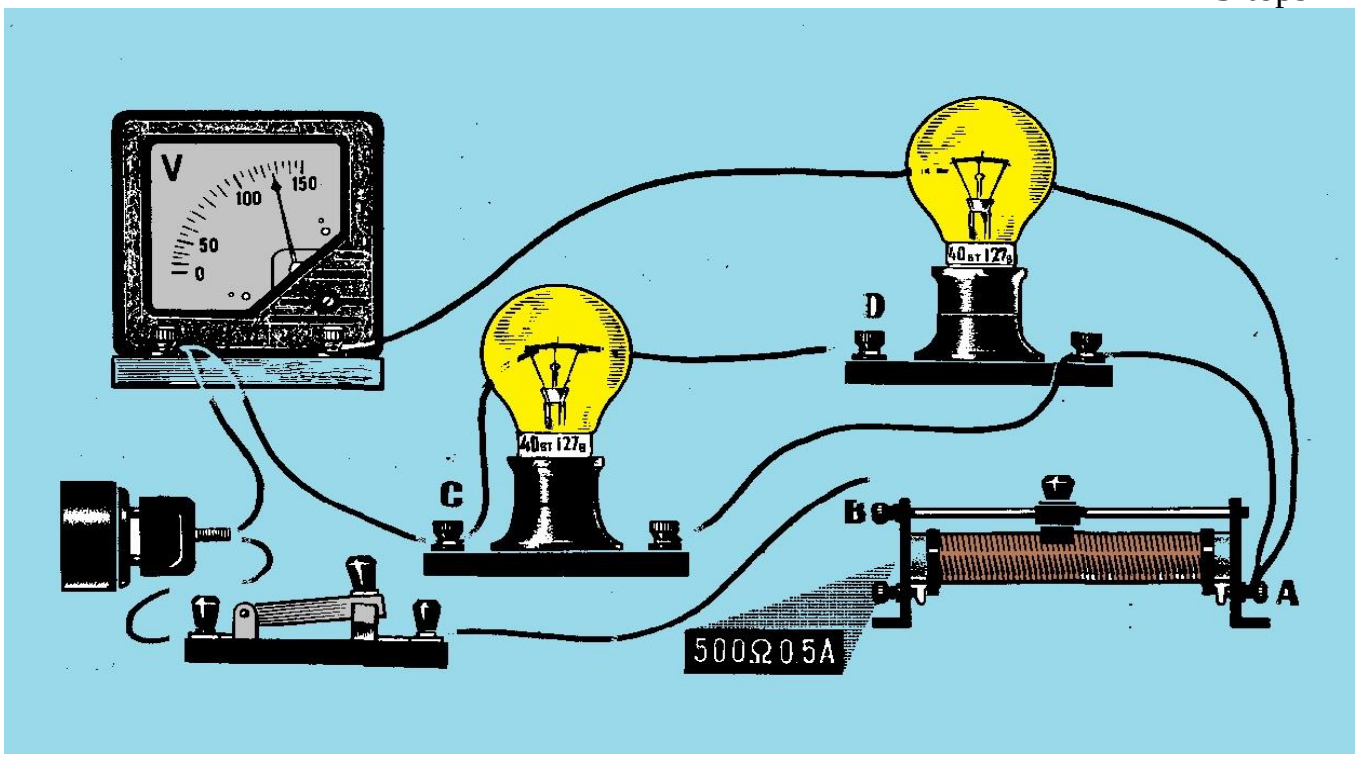
3. Voltmetr ko'rsatishi oshadi.

4. $I_2 = \frac{U_2}{R_{L2}} = \frac{220V}{605A} =$ 0,36 A.

5. Voltmetr ko’rsatishi oshadi, chunki uning qarshiligi lampa qarshiligidan katta. Bu holda voltmetr o’zining xususiy qarshiligidagi kuchlanish tushuvini ko’rsatadi.

6. $I_2 = \frac{U_{L1}}{R_{L1}} = 0{,}17$ A

3-topshiriq

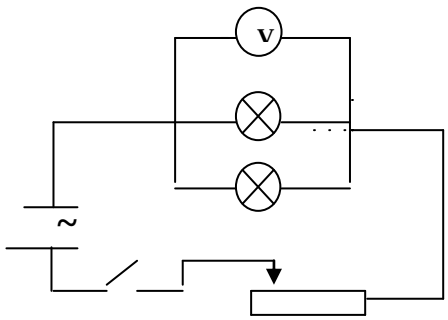


3 a rasm

1. Rasmdagi elektr zanjiriing prinsipial sxemasini chizing.
2. A va C, B va C, C va D qisqichlarga ulangan voltmetr qanday kuchlanishni o’lchaydi?
3. A va B qisqichlarga ulangan voltmetr kalit ulangan va ulanmagan holda nimani o’lchaydi.
4. Agar lampalardan bittasi kuyib qolsa, voltmetr ko’rsatishi qanday o’zgaradi.
5. Agar reostat surgichi chapga surib qo’yilsa, lampalardagi kuchlanish qanday o’zgaradi.
6. Zanjirdagi reostat vazifasi nimadan iborat?
7. Agar rheostat surgichi o’ngga surib qo’yilsa, zanjidagi tok kattaligi qanday o’zgaradi.
8. Zanjirdagi tok qiymatini toping.

3–a rasmning yechimi

1.



2. A va C qisqichlarga ulangan voltmetr, parallel ulangan lampalardagi kuchlanishni o'lchaydi. Voltmetr B va C qisqichlarga ulanganda butun zanjirdagi kuchlanishni o'lchaydi, C va D qisqichlarga ulanganda esa o'tkazgich oxiridagi deyarli nolga teng bo'lgan kuchlanishni o'lchaydi.

3. Voltmetr reostatdagi kuchlanish tushuvini o'lchaydi. Rubilnik ajratilgan holatda voltmetrdagi kuchlanish nolga teng bo'ladi.

4. Voltmetr ko'rsatishi kam miqdorda oshadi.

5. Kuchlanish kamayadi.

6. Reostat lampadagi kuchlanishni kamaytiradi.

7. Tok oshadi, chunki zanjir qarshiligi kamayadi.

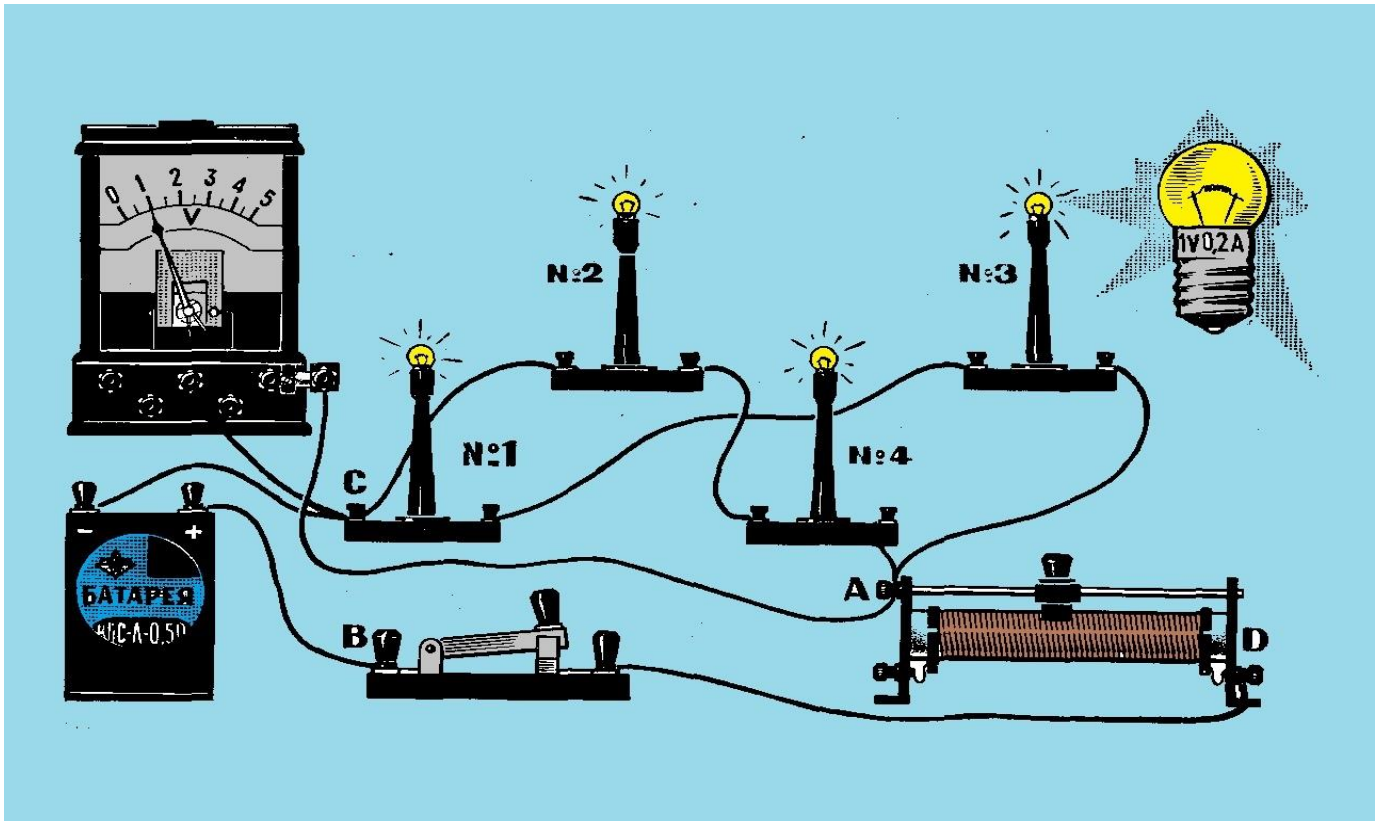
8. Lampa qarshiligini uning pasportida ko'rsatilgan kattaliklardan foydalanib topish mumkin:

$$R_L = \frac{U^2}{P} = \frac{(127V)^2}{40Vt} = 403\Omega$$

Lampadagi tok:

$$I_L = \frac{U_L}{R_{L1}} = \frac{63.5V}{403\Omega} = 0{,}13\ A$$

Zanjirdagi tok lampadagi tokning ikkilangan qiymatiga teng bo'ladi: $U_Z = I_L\ 2 = 0{,}13\ A\ \ 2 = 0{,}26\ A$.



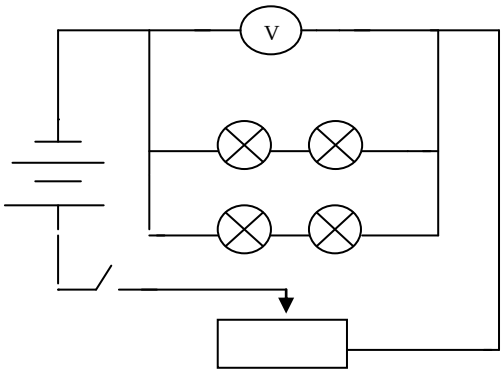
3 b rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. A va C, B va C, A va D qisqichlarga ulangan voltmetr qanday kuchlanishni o'lchaydi.
3. A va B qisqichlarga ulangan voltmetr kalit ulangan va ulanmagan hollarda nimani o'lchaydi?

4. Agar lampalardan bittasi kuysa, voltmetr ko’rsatishi o’zgaradimi. Javobingizni asoslang.
5. Agar reostat surgichi chapga surilsa, lampalardagi kuchlanish qanday o’zgaradi.
6. Zanjirdagi reostatning vazifasi nima?
7. Agar reostat surgichini o’ngga surilsa, zanjirdagi tok kattaligi qanday o’zgaradi.
8. Zanjirdagi tok qiymatini toping.

3–b rasmning yechimi

1.



2. A va C qisqichlarga ulangan voltmetr parallel ulangan lampalar tugunlaridagi kuchlanishni o’lchaydi. Agar uni B va C qisqichlarga ulansa, butun zanjirdagi kuchlanishni o’lchaydi, A va D qisqichlarda esa reostatdagi kuchlanishni o’lchaydi.

3. Rubilnik ulangan holatda voltmetr reostatdagi kuchlanishni o’lchaydi, Rubilnik ulanmagan holatda esa batareyadagi EYuKni o’lchaydi.

4. Kuchlanish oshadi, chunki zanjir qarshiligi (parallel tarmoqdagi lampalardan bittasi) oshadi.

5. Kuchlanish pasayadi, chunki butun zanjirdagi qarshilik oshadi.

6. Reostat lampalardagi kuchlanishni kamaytiradi.

7. Reostat surgichini o’ngga surganda butun zanjir qarshiligi kamayadi, bu esa tokning oshishiga olib keladi.

8. Bitta lampadagi tokni topamiz. Lampadagi kuchlanish voltmeter ko’rsatgan kuchlanishning yarmisiga teng bo’ladi, chunki barcha lampalarning qarshiligi bir xil. Lampalarning qarshiligini ularning pasportida ko’rsatilgan kattaliklardan foydalanib topamiz*:

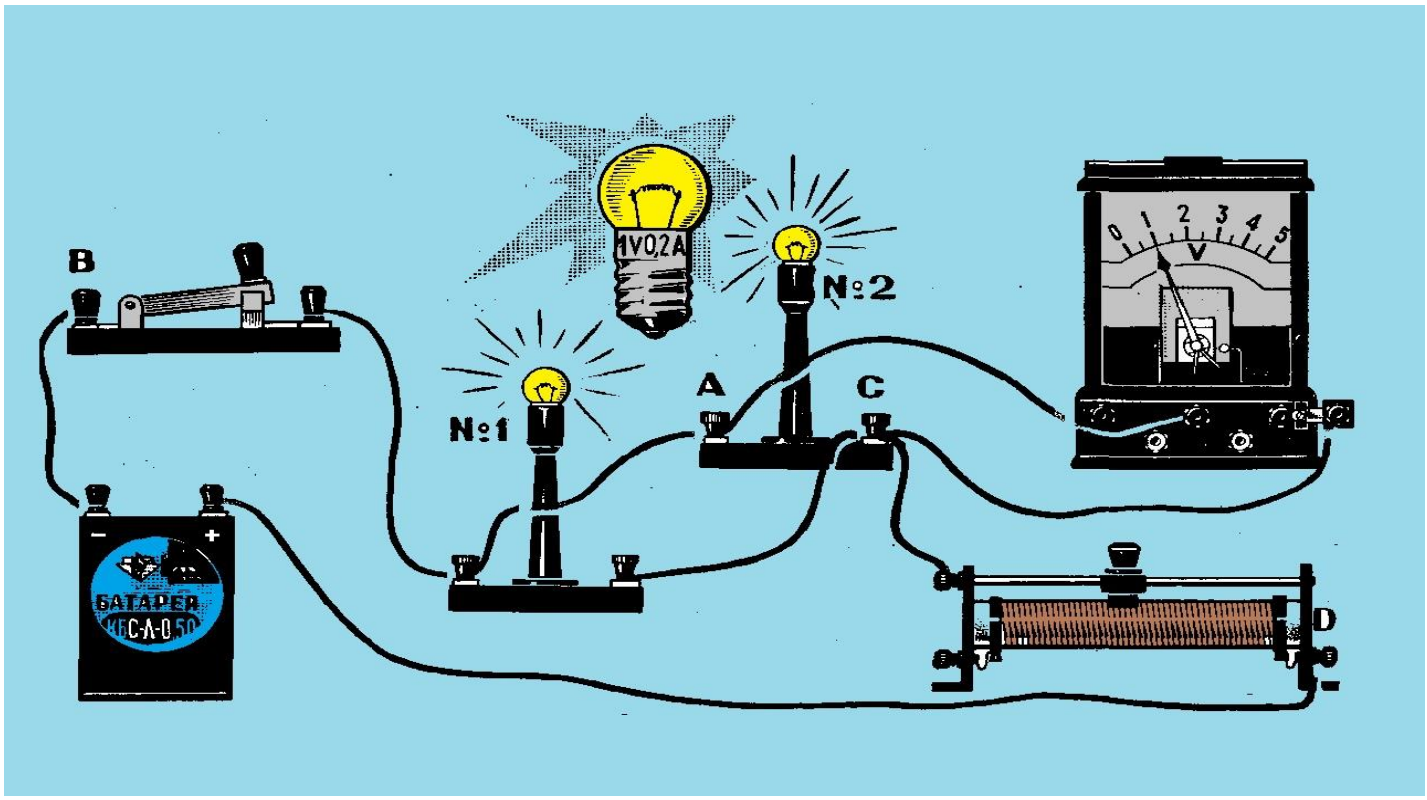
* Lampa qarshiligi uning cho’g’lanish tolasini normal ish rejimida aniqlanadi. Lampalar cho’g’lanish tolasining harorati o’zgarishidan qarshiligining o’zgarishini masalalar yechishda hisobga olmaymiz.

$$R_L = \frac{U_L}{I} = \frac{1V}{0.2A} = 5\ \Omega.$$

U holda lampadagi tok:

$$I_L = \frac{U_L}{R_L} = \frac{0.5V}{5\Omega} = 0{,}1\ A.$$

Zanjirdagi tok: $I_Z = 2\ I_L = 2\ 0{,}1\ A = 0{,}2\ A$

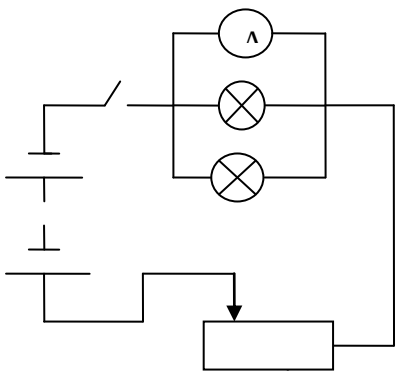


3 c rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. A va C, B va C, A va D qisqichlarga ulangan voltmetr qanday kuchlanishni o'lchaydi.
3. A va B qisqichlarga ulangan voltmetr kalit ulangan va ulanmagan hollarda nimani o'lchaydi?
4. Agar lampalardan bittasi kuysa, voltmetr ko'rsatishi qanday o'zgaradi?
5. Agar reostat surgichi chapga surilsa, lampalardagi kuchlanish qanday o'zgaradi?
6. Zanjirdagi reostatning vazifasi nima?
7. Agar reostat surgichini o'ngga surilsa, zanjirdagi tok kattaligi qanday o'zgaradi.
8. Voltmetrning rasmdagi ulanish bo'yicha zanjirdagi tok kattaligini toping.

3-c rasmning yechimi

1.



2. A va C qisqichlarga ulangan voltmetr parallel ulangan barcha lampalardagi kuchlanishni o'lchaydi. B va C qisqichlarga ulanganda ham A va C qisqichlarda

o’lchangan kuchlanishni o’lchaydi. A va D qisqichlarga ulanganda esa reostatdagi kuchlanish o’lchanadi.

3. Voltmetr tok manbai qisqichlaridagi kuchlanishni o’lchaydi, chunki voltmetrdan o’tayotgan tokning kichikligidan zanjirdagi kuchlanish tushuvini hisobga olmaslik mumkin.

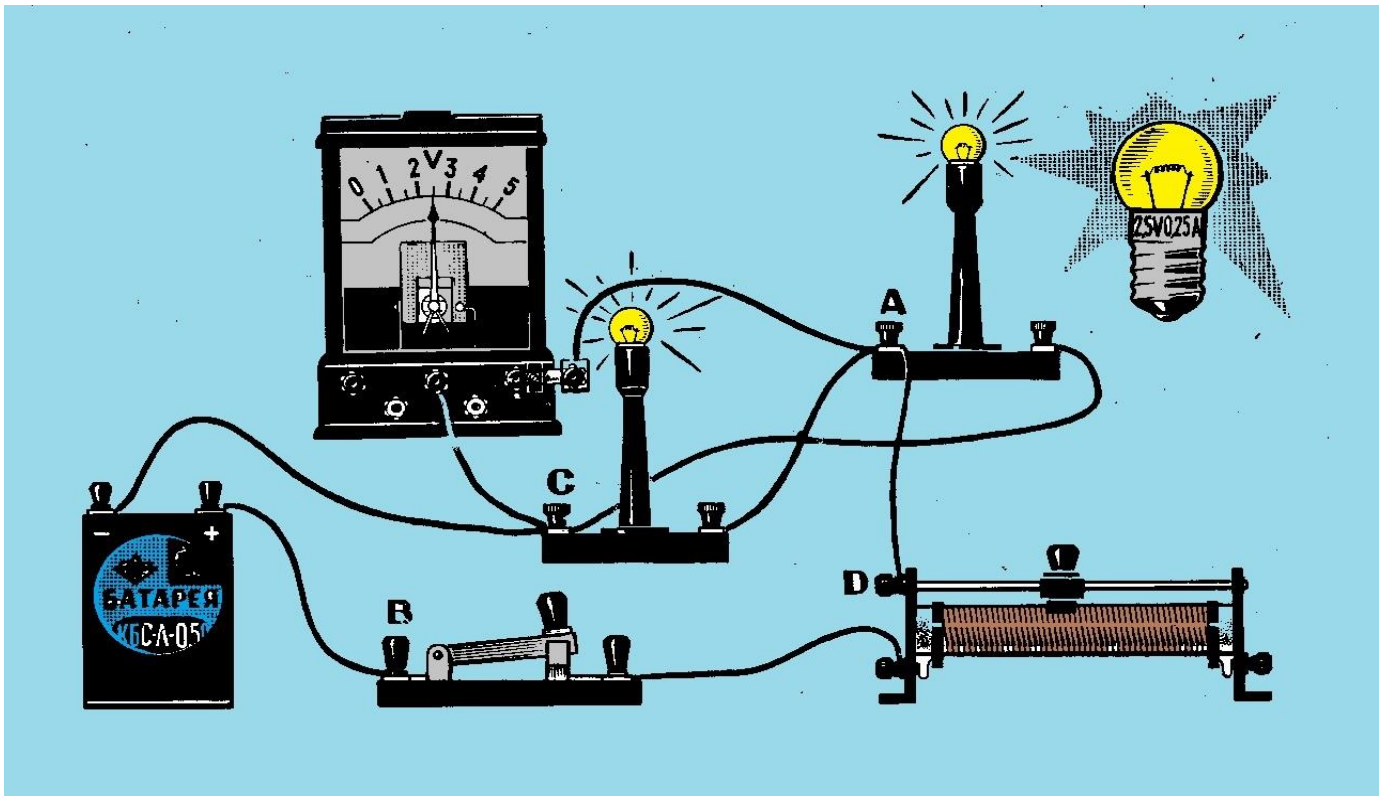
4. Kuchlanish oshadi, chunki zanjirning ko’rilayotgan qismidagi qarshilik oshadi.

5. Lampadagi kuchlanish kamayadi, chunki tashqi zanjir qarshiligi oshadi, bu esa lampadagi tok va kuchlanishning kamayishiga olib keladi.

6. Reostat lampadagi kuchlanishni kamaytiradi.

7. Zanjirdagi tok oshadi, chunki zanjirning qarshiligi kamayadi.

8. Avval bitta lampa zanjiridagi tokni aniqlash kerak. Zanjirdagi tok esa lampadagi tokning ikkilangan qiymatiga teng bo’ladi. Lampadagi kuchlanishning minimal qiymatida undagi tok ham minimal qiymatga ega bo’ladi, ya’ni 0,2 A. U holda zanjirdagi tok 0,4 A ga teng bo’ladi.

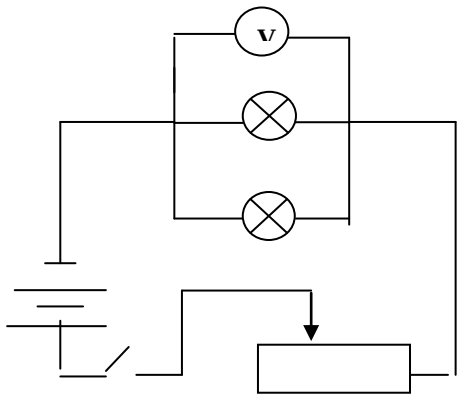


3 d rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. A va C, B va C, A va D qisqichlarga ulangan voltmetr qaysi kuchlanishni o’lchaydi.
3. A va B qisqichlarga ulangan voltmetr kalit ulangan va ulanmagan hollarda nimani o’lchaydi?
4. Agar lampalardan bittasi kuysa, voltmetr ko’rsatishi qanday o’zgaradi?
5. Agar reostat surgichi chapga surilsa, lampalardagi kuchlanish qanday o’zgaradi?
6. Zanjirdagi reostatning vazifasi nimadan iborat?
7. Agar reostat surgichini o’ngga surilsa, zanjirdagi tok qanday o’zgaradi.
8. Zanjirdagi tokning qiymatini toping.

3-d rasmning yechimi

1.



2. A va C qisqichlarga ulangan voltmetr lampadagi kuchlanishni o'lchaydi. A va C qisqichlarga ulangan voltmetr butun zanjirdagi kuchlanishni o'lchaydi, A va D qisqichlarga ulanganda esa o'tkazgich oxiridagi deyarli nolga teng bo'lgan kuchlanishni o'lchaydi.

3. Rubilnikning ulangan holatida voltmetr reostatdagi kuchlanish tushuvini o'lchaydi. Ajratilgan rubilnikda esa, tok manbai qisqichlaridagi kuchlanishni o'lchaydi. Chunki voltmetrdan o'tayotgan kichik tokdagi kuchlanish tushuvini hisobga olmaslik mumkin.

4. Voltmetr ko'rsatishi oshadi, chunki lampalardan bittasi kuyganda zanjirning voltmetr ulangan qismlaridagi qarshilik oshadi, bu esa zanjirda kuchlanishning qayta taqsimlanishiga olib keladi.

5. Lampalardagi kuchlanish oshadi, chunki reostat surgichining chapga surilishi reostat ulangan qismdagi qarshilikning kamayishiga olib keladi, bu esa parallel ulangan lampalar guruhi bilan reostat orasida kuchlanishning qayta taqsimlanishiga olib keladi. Bu hodisani boshqacha tushuntirish ham mumkin. Reostat surgichining chapga surilishi butun zanjirdagi qarshilikning kamayishiga va undagi tokning oshishiga olib keladi. Tokning oshishi kuchlanish tushuvining oshishiga olib keladi.

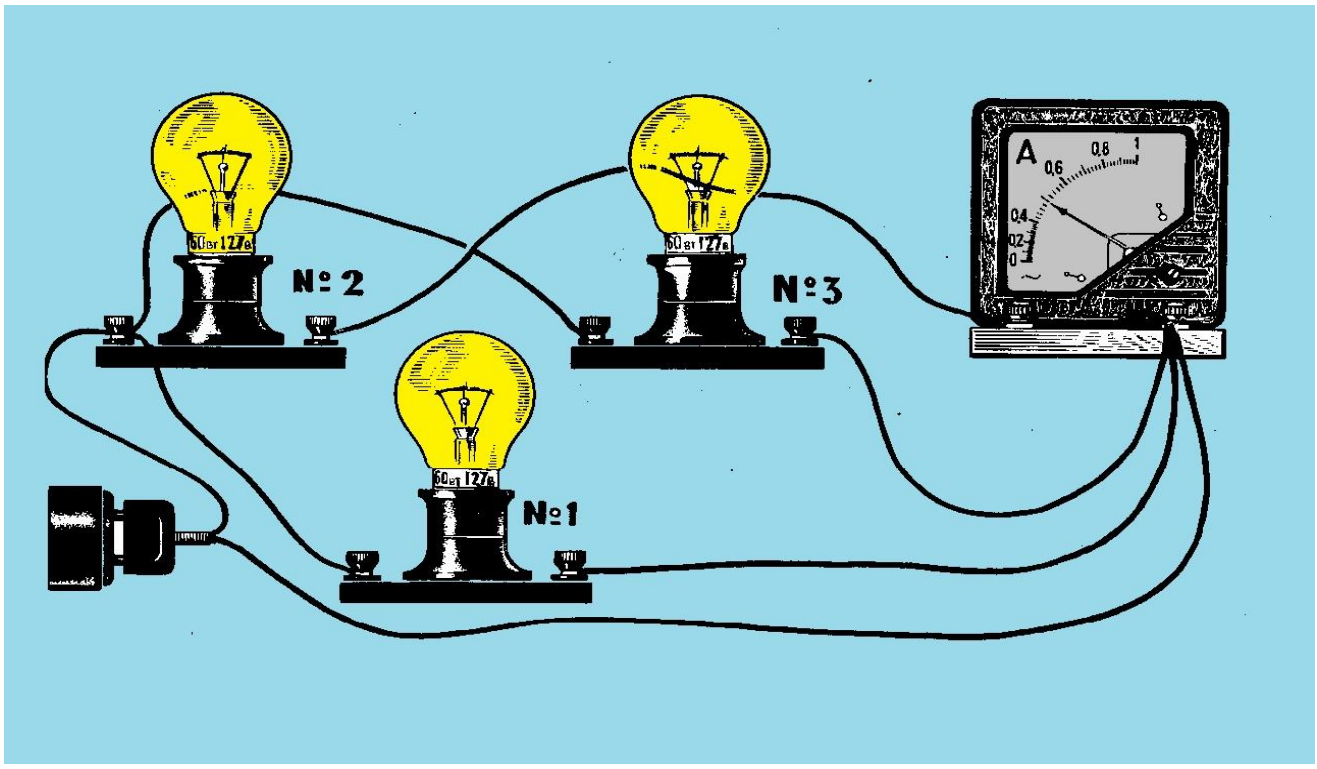
6. Zanjirdagi reostat lampadagi kuchlanishni kamaytiradi.

7. Zanjir qarshiligi oshganligi sababli undagi tok kamayadi.

8. Minimal kuchlanishda lampadagi tok ham minimal bo'ladi, shuning uchun zanjirdagi tok lampadagi tokning ikkilangan qiymatiga teng bo'ladi, ya'ni:

$$U_Z = 2\,I_L = 2 \quad 0{,}25\ A = 0{,}5\ A.$$

4-topshiriq

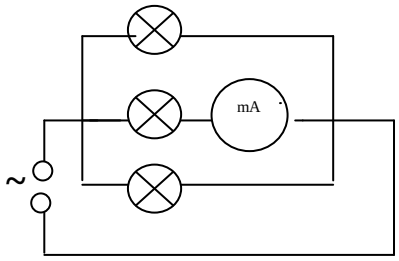


4 a rasm

1. Rasmdagi zanjiriing prinsipial elektr sxemasini chizing.
2. № 1 lampadagi tok qiymatini toping.
3. № 2 lampa kuyib qolsa ampermetrning ko’rsatishi qanday o’zgaradi?
4. Har bir lampani qisqichlardagi kuchlanishning taqribiy qiymatini toping.
5. Zanjirdagi qarshilikning qiymatini toping.

4-a rasmning yechimi

1.



2. $I_{L1} = I_{L2} = I_{L3} = 0{,}5$ A.

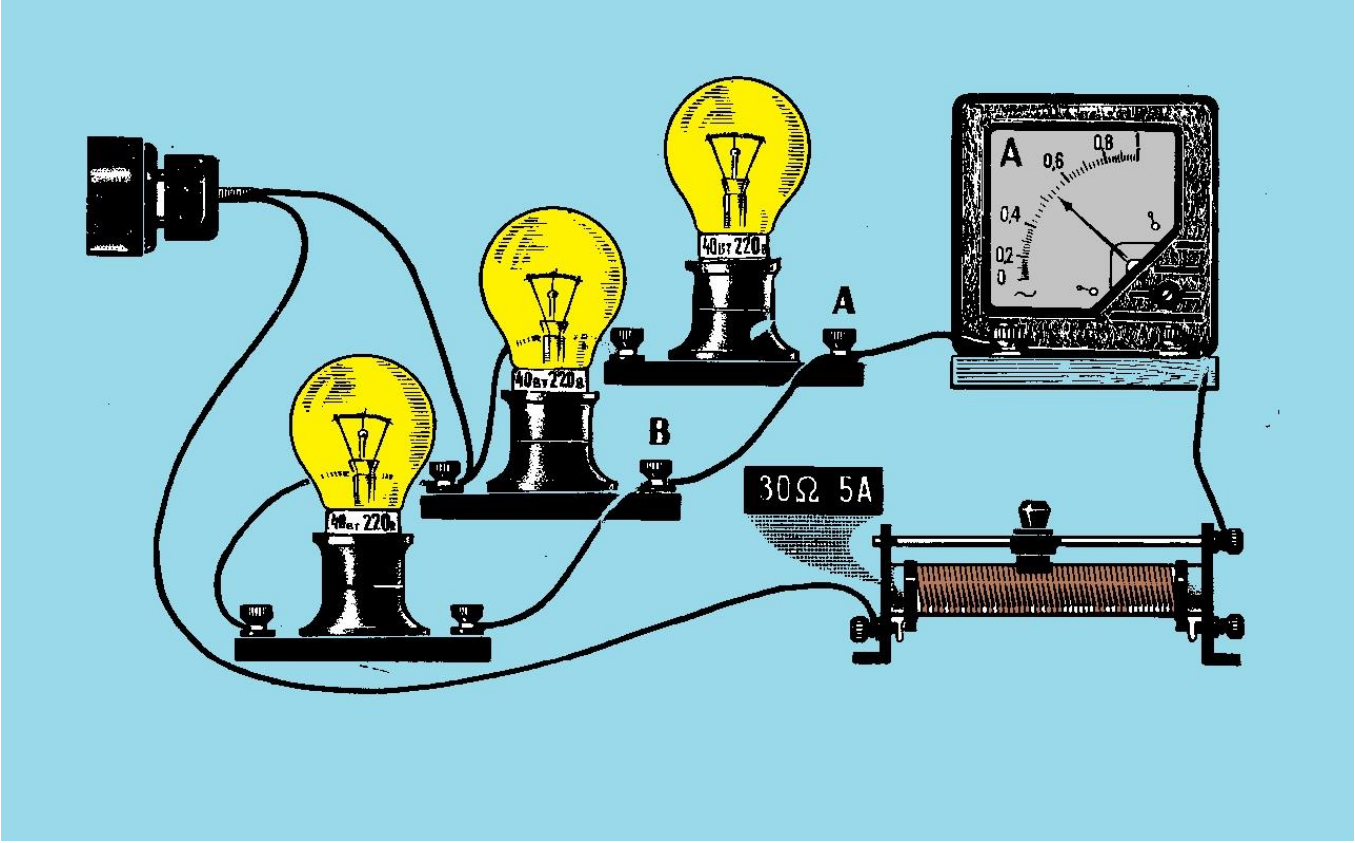
3. Ampermetr ko’rsatishi nolga teng bo’ladi.

4. Lampadagi kuchlanishni aniqlash uchun oldindan uni sokolida ko’rsatilgan kattaliklardan foydalanib qarshiligini topish kerak, ya’ni:

$$R_L = \frac{U_L^2}{P} = 269\ \Omega$$

$U_L = R_L I_L = 269\Omega \cdot 0{,}5\ A = 134{,}5$ V.

5. $R_Z = \frac{R_L}{n} = \frac{269\Omega}{3} = 89\ \Omega$.

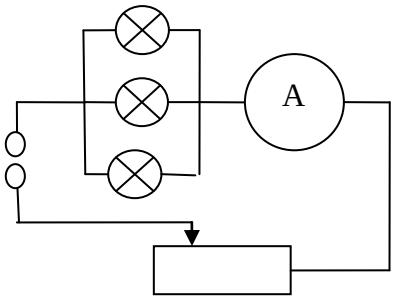


4 b rasm

1. Rasmdagi zanjiriing prinsipial elektr sxemasini chizing.
2. Bitta lampadagi tok qiymatini toping.
3. Agar zanjirdagi lampa kuyib qolsa, ampermetrning ko'rsatishi qanday o'zgaradi?
4. Har bir lampa qisqichlardagi kuchlanishni toping.
5. Zanjirdagi qarshilikning qiymatini toping.

4-b rasmning yechimi

1.



2. $I_L = \frac{I_Z}{n} = \frac{0.54A}{3} = 0{,}18$ A.

3. Ampermetr ko'rsatishi 3 marta kamayadi. Ammo bu top shiriqni aniqroq ko'rib chiqib shuni aytish kerakki, zanjirdagi tok kamayishi 3 martadan kamroq bo'ladi.

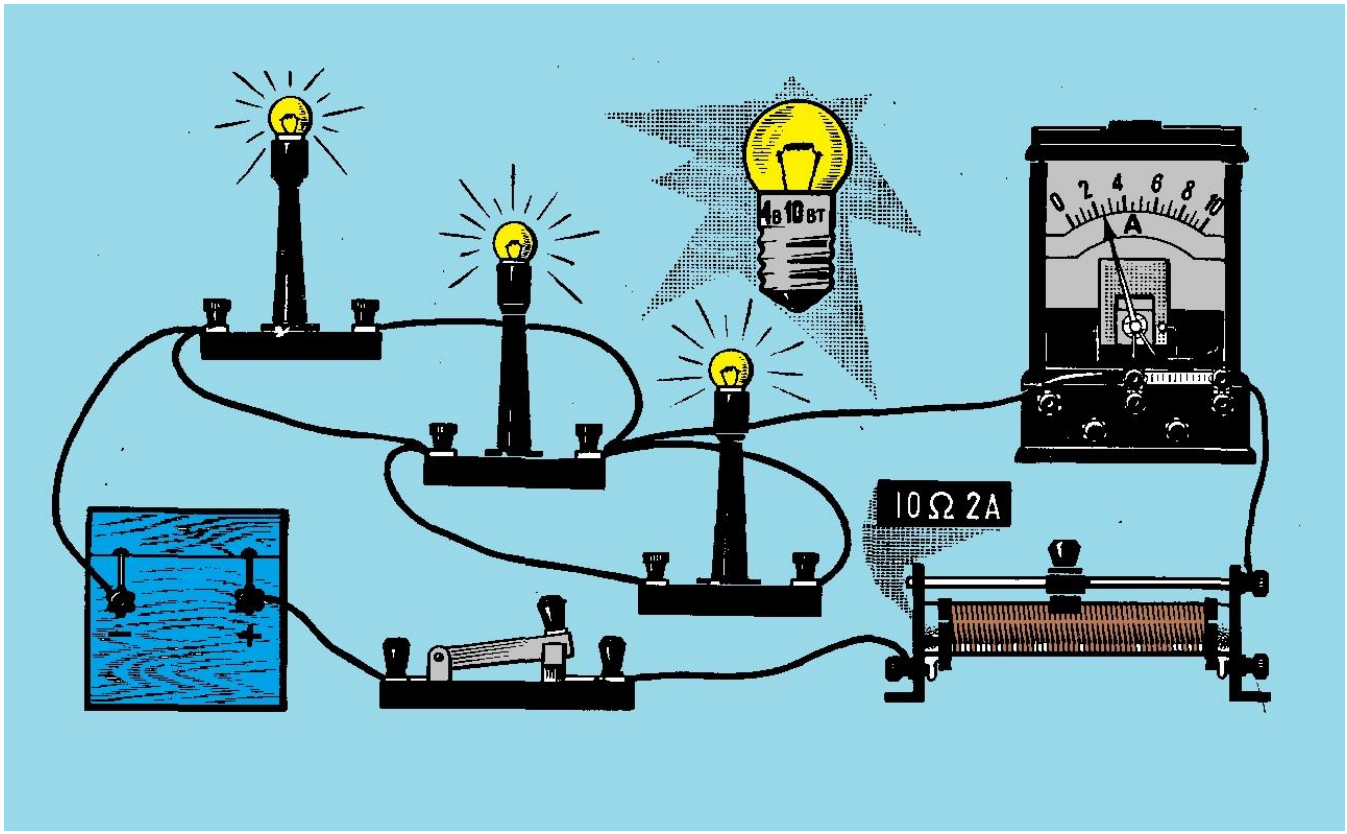
Bu quyidagicha tushuntiriladi: Lampalardan ikkitasi kuyib qolganda reostat va qolgan lampa o'rtasida kuchlanishni qayta taqsimlanishi ro'y beradi. Lampadagi kuchlanish ortadi, chunki zanjirdagi tok kamayishi sababli reostatdagi kuchlanish

tushuvi kamayadi, bu esa lampadagi tokning 3 ta lampaning kuyishidan oldingi tokiga nisbatan biroz oshishiga olib keladi.

4. $U_L = I_L R_L = I_L \frac{U_L^2}{P} = 0{,}18\ A \frac{(220V)^2}{40Vt} = 218\ V.$

5. Reostat surgichi holatidan shunday fikrlash mumkinki, zanjirda uning qarshiligini yarmisi, ya'ni, 15Ω ishtirok etadi. Parallel ulangan lampalarning (Rn) qarshiligini Om qonuniga binoan topamiz:

$$R_n = \frac{U_L}{I_Z} = \frac{218V}{0.54A} = 404\ \Omega. \qquad \text{U holda } R_Z = 404\Omega + 15\Omega = 419\ \Omega$$

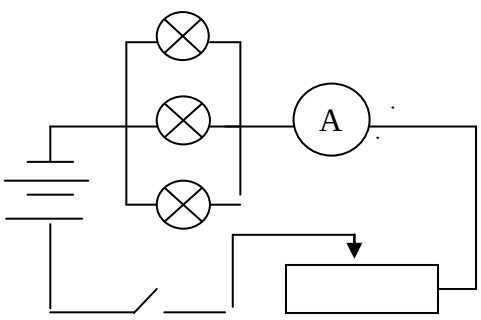


4 c rasm

1. Rasmdagi zanjiriing prinsipial elektr sxemasini chizing.
2. Bitta lampadagi tokning qiymatini toping.
3. Agar zanjirdagi lampa kuyib qolsa, ampermetrning ko'rsatishi qanday o'zgaradi?
4. Har bir lampa qisqichlardagi kuchlanishni toping.
5. Zanjirdagi qarshilikning qiymatini toping.

4–c rasmning yechimi

1.



2.

$$I_L = \frac{I_Z}{n} = \frac{2.5A}{3} = 0{,}83\ \text{A}.$$

3. Ampermetr ko'rsatishi kamayadi, chunki zanjir qarshiligi oshadi.

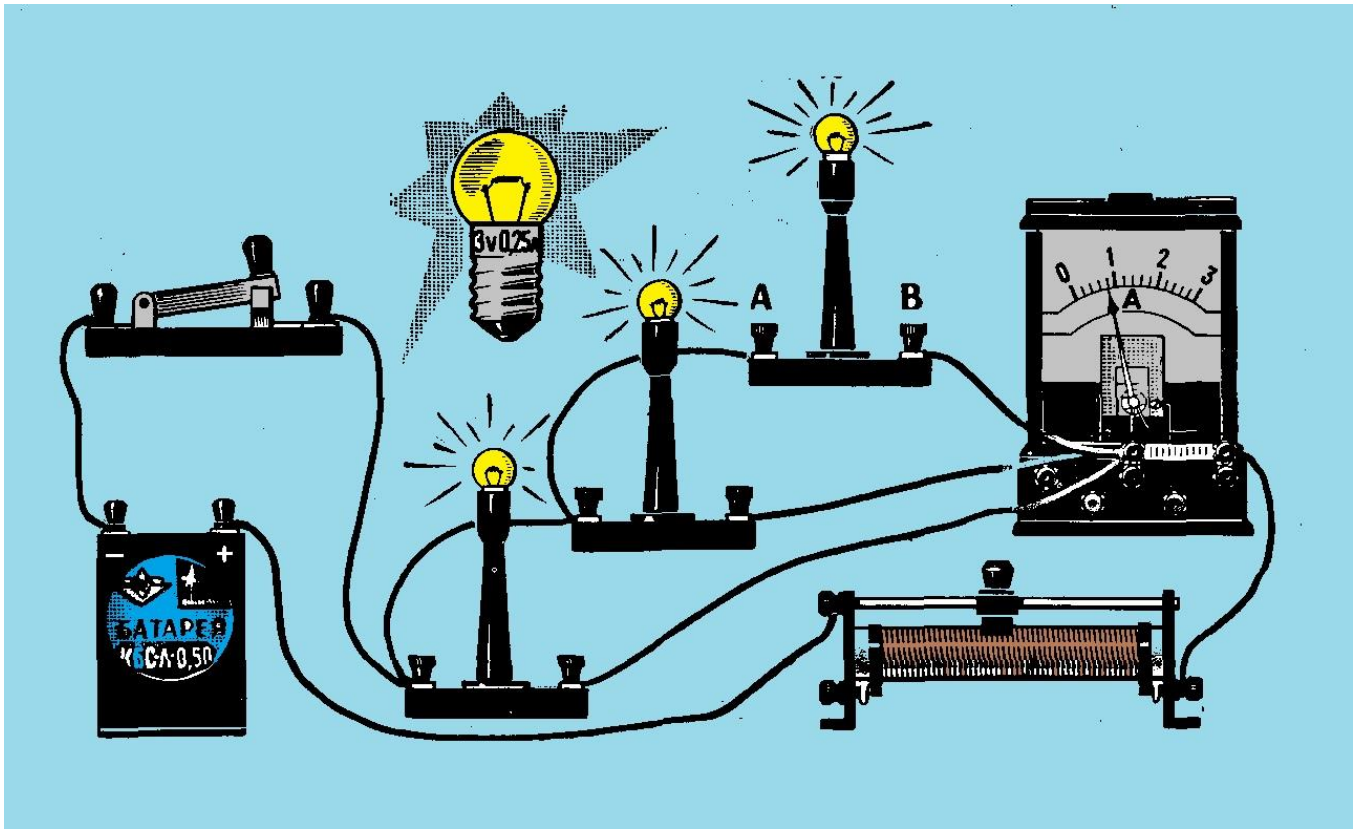
4. $$U_L = I_L R_L = I_L \frac{U_L^2}{P} = 0{,}18\ \text{A}\ \frac{(4V)^2}{10Vt} = 1.3\ \text{V}.$$

5. Yechimidan ko'rinadiki, reostatning ishchi qismini qarshiligi taxminan 5ni tashkil qiladi. Parallel ulangan barcha lampalarning (Rn) qarshiligini Om qonuniga binoan topamiz:

$$R_n = \frac{I_L}{I_Z} = \frac{1.3V}{2.5A} = 0{,}52\ \Omega.$$

Zanjirning to'la qarshiligi esa:

$$R_Z = R_n + R_r = 0{,}52\ \Omega + 5\ \Omega = 5{,}52\ \Omega\ .$$

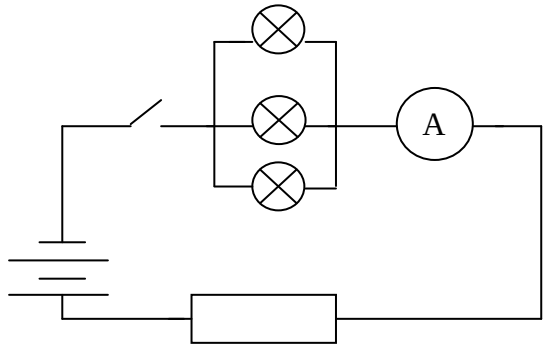


4 d rasm

1. Rasmdagi zanjiriing prinsipial elektr sxemasini chizing.
2. Bitta lampadagi qarshiligini toping.
3. Zanjirning A vaB qisqichlarga yana bitta lampa ulansa, ampermetrning ko'rsatishi qanday o'zgaradi?
4. Lampalar normal kuchlanish ostida bo'lishi uchun zarur bo'lgan reostat qarshiligini toping.
5. Zanjirdagi qarshilikni toping.

4-d rasmning yechimi

1.



2. Lampalarning qarshiligini ularning pasportida berilgan kattaliklardan foydalanib aniqlash kerak.

$$R_L = \frac{U}{I} = \frac{3V}{0.25A} = 12\ \Omega.$$

3. Zanjir qarshiligi kamayganligi sababli tok oshadi.

4. Reostat qarshiligini (lampalar normal sharoitda yonganda) tok manbaidagi va ampalardagi kuchlanish orasidagi munosabatdan kelib chiqqan holda aniqlash mumkin. Agarda batareya qisqichlaridagi kuchlanish 4,5 V *, lampalar normal yonganda ulardagi kuchlanish 3 V bo'lishini e'tiborga olsak, 1,5 V reostat qarshiligi yordamida so'ndirilishi lozim. Uchta lampadagi tokka teng bo'lgan zanjir tokida reostat qarshiligi

quyidagicha bo'ladi:

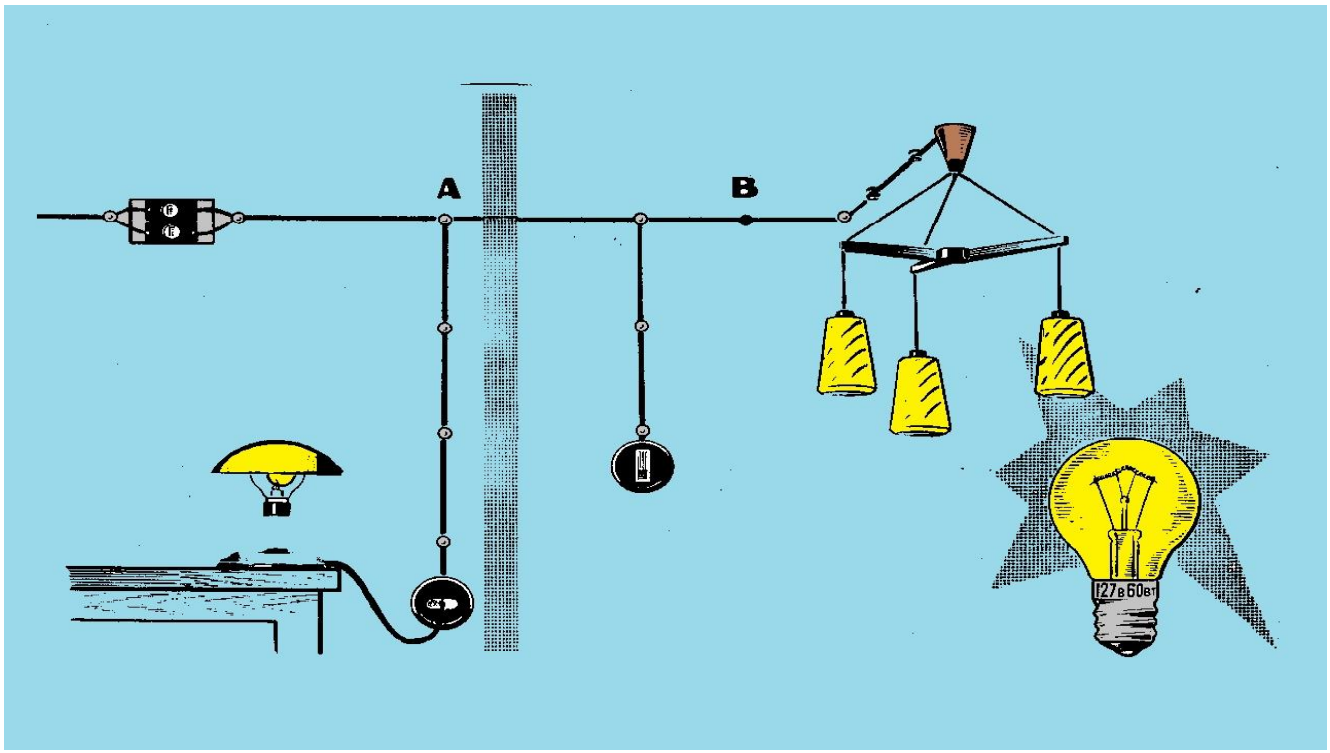
$$R_R = \frac{U}{I} = \frac{1.5V}{0.75A} = 2\ \Omega.$$

5.

$$R_Z = \frac{12\Omega}{3} + 2\ \Omega = 6\ \Omega.$$

* Normal yuklanishda batareya qisqichlaridagi kuchlanish 3,7 V ga teng. Bu kuchlanish ba'zi hollarda batareya pasportida ko'rsatiladi. Hisoblashlardagi soddalik uchun batareya kuchlanishi batareyaning EYuK iga teng deb qabul qilinadi, ya'ni: 1,5 V, 4,5 V, 9 V. Ushbu holatda 4,5 V.

5-topshiriq

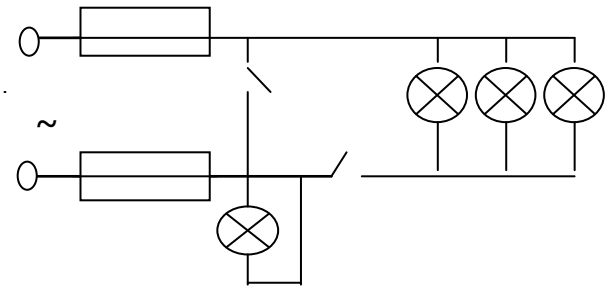


5 a rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. Devordagi uzib-ulagich ta’siri qaysi lampalar uchun ta’luqli?
3. Agar shtepselni A nuqtadan B nuqtaga o’tkazsak, kalit ta`siri qanday o’zgaradi?
4. Agar barcha ulangan lampalar bir xil bo’lsa, butun zanjirdagi quvvatni toping.
5. Rasmdagi zanjir uchun qanday tokka mo’ljallangan eruvchan saqlagich tanlash kerak? (5A, 10A, 25A).

5 –a rasmning yechimi

1.

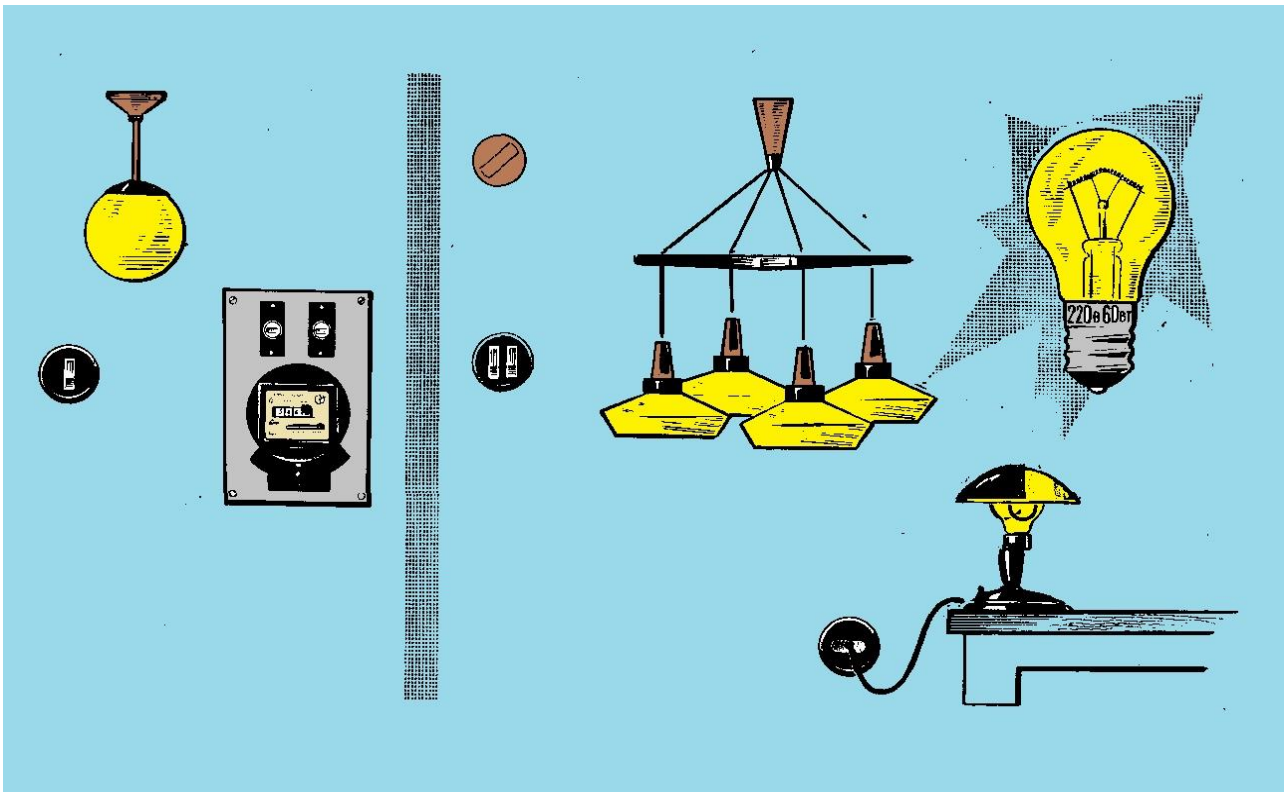


2. Devordagi kalit qandil lampalari uchun taaluqli.

3. Agar shtepselni A nuqtadan ajratib, B nuqtaga ulansa, devordagi kalit xonadagi barcha lampalar uchun taluqli.

4. P = 60 Vt 4 = 240 Vt.

5. 5 A ga mo’ljallangan eruvchan saqlagich tanlash lozim.

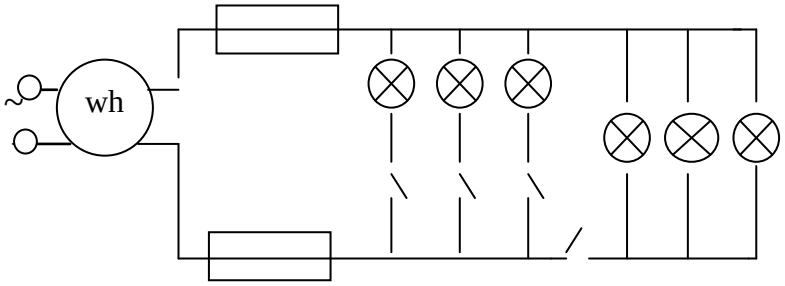


5 b rasm

1. Rasmdagi kalit orqali lyustraning to’rtta, uchta, bitta lampalarini ulash mumkin bo’lgan elektr sxemasini chizing.
2. Xonadondagi lampalar bilan bir xil bo’lgan lampani eruvchan saqlagich o’rniga ulab, lampadan keyin simlarni qisqa tutashtirsak, lampa yonadimi?
3. Eruvchan saqlagichlardan qaysi biri kuyib qolganini xonadondagi lampalar yordamida topish mumkinmi?
4. Xonadagi lampalar bir xil bo’lsa, ularning umumiy quvvati qanday?
5. Bu zanjir uchun qanday tokka mo’ljallangan eruvchan saqlagich tanlash lozim?

5-b rasmning yechimi

1.



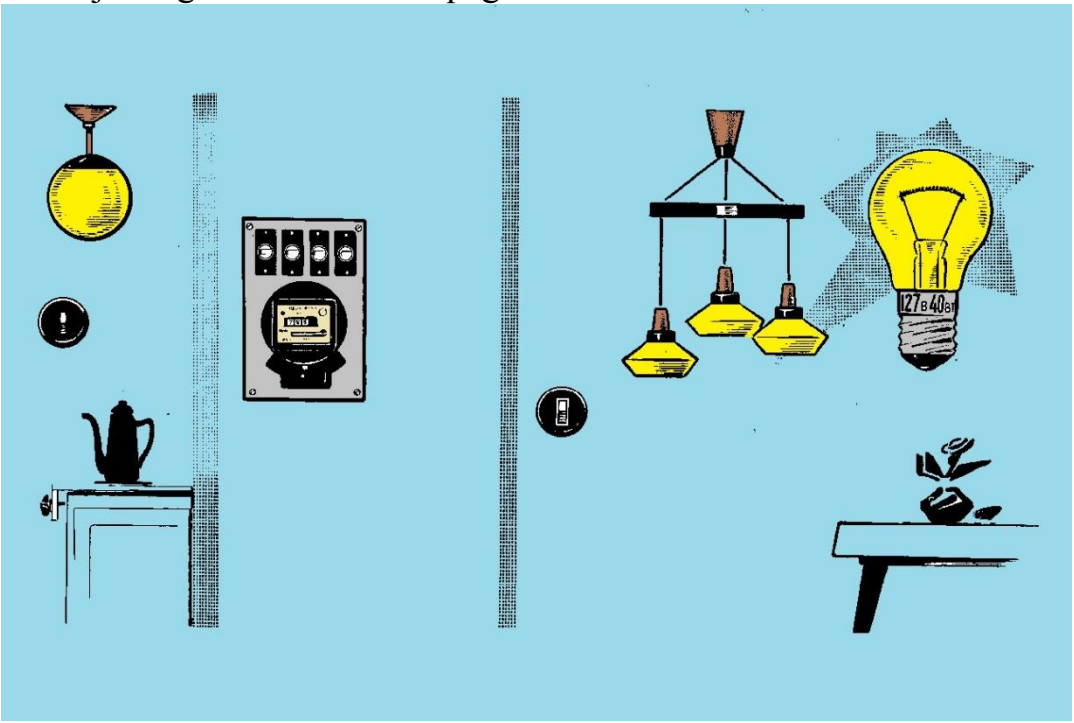
Pereklyuchatel П ni ikkita bir qutbli rubilniklar shaklida tasavvur qilish mumkin.

2. Xonadagi o’tkazgichlar qisqa tutashtirilganda eruvchan saqlagich o’rniga o’rnatilgan lampaning cho’g’lanish tolasi to’la ravshanlikda yonadi.

3. Kuygan eruvchan saqlagichni aniqlash uchun xonadagi lampalardan bittasini yechib olib, kalit ulangan xolda eruvchan saqlagichlar uyasiga navbatma- navbat buraladi. Lampa kuygan eruvchan saqlagich uyasiga ulanganda u xira yonib, xonadagi jihozlar ishga tushadi.

4. P = 60 Vt 6 = 360 Vt.

5. 5 A ga mo’ljallangan eruvchan saqlagichlarni tanlash kerak.

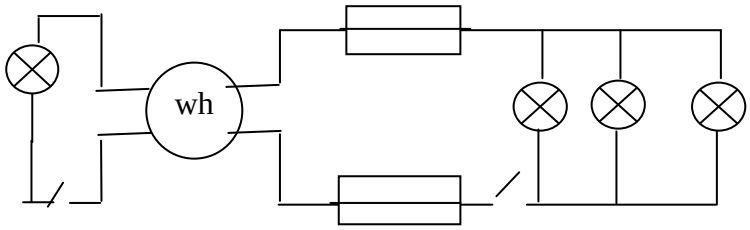


5 c rasm

1. Rasmdagi zanjiriing prinsipial elektr sxemasini chizing.
2. Agar eruvchan saqlagichlardan bittasining o’rniga lampa ulansa, xonadagi lampalarning yonishiga tasir ko’rsatadimi?
3. Agar eruvchan saqlagichdan bittasi kuyib qolsa, qanday xodisa sodir bo’ladi?
4. Agar xonadagi barcha lampalar bir xil bo’lsa, butun zanjiragi quvvatni toping?
5. Rasmdagi zanjir uchun qanday tokka mo’ljallangan eruvchan saqlagich tanlash kerak? (5A, 10A, 25A).

5-c rasmning yechimi

1.

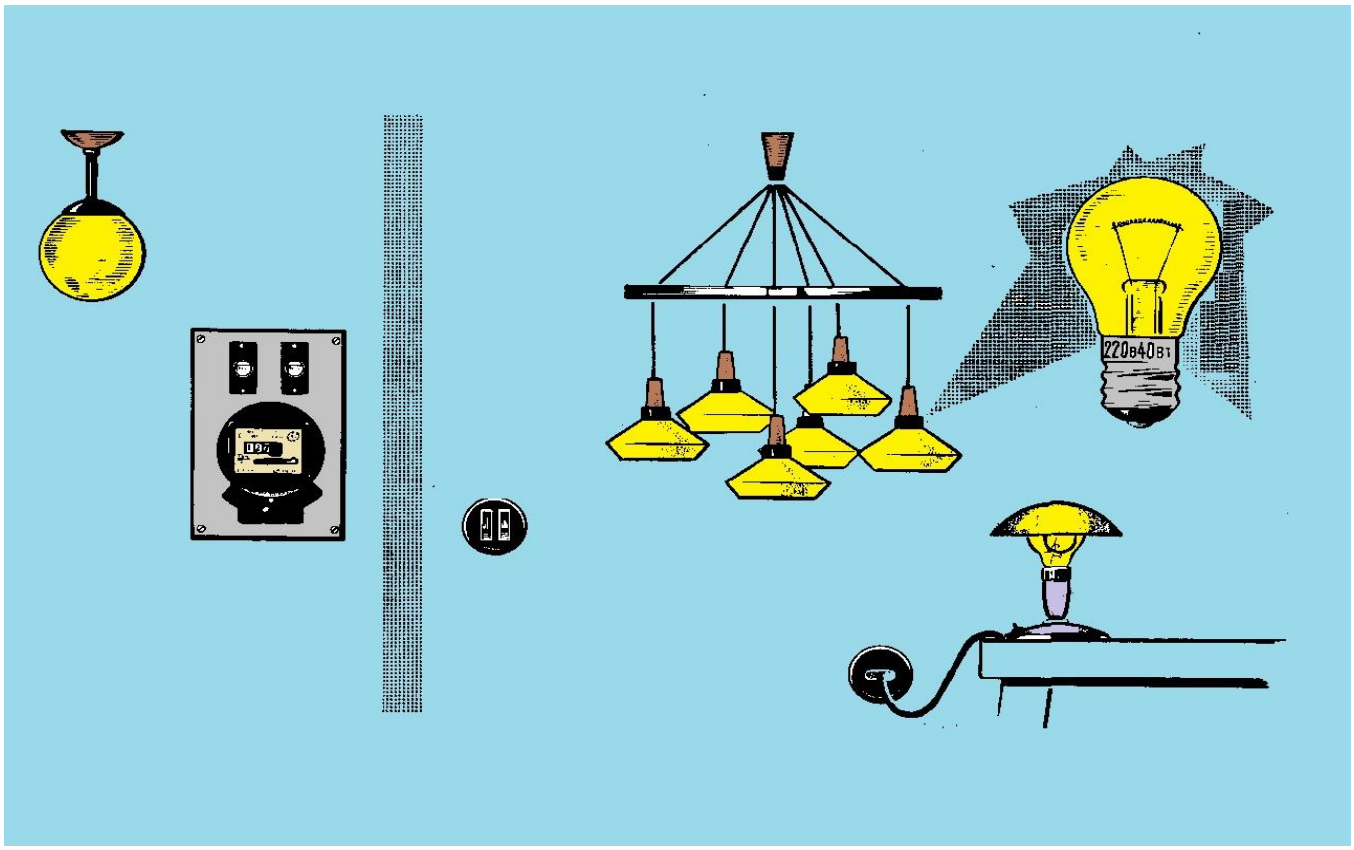


2. Eruvchan saqlagich o’rniga burab qo’yilgan lampa xonadondagi u yoki bu lampa guruhlari bilan ketma – ket ulanadi. Shuning uchun ushbu guruh lampalari xira yonadi.

3. Eruvchan saqlagichi kuygan guruh lampalari o’chib qoladi.

4. P = 40 Vt 4 = 160 Vt.

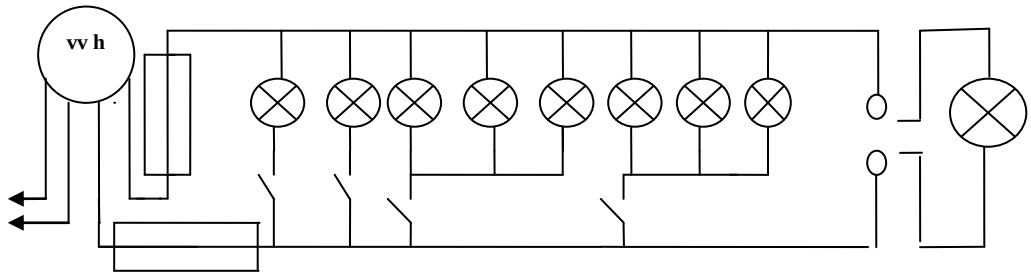
5. 5 A ga mo’ljallangan eruvchan saqlagichlarni tanlash kerak.



5 d rasm

1. Rasmdagi 3 yoki 6 lampani ulashi mumkin bo'lgan elektr zanjiriing sxemasini chizing.
2. Agar eruvchan saqlagich o'rniga lampa ulansa, xonadagi lampalarning cho'g'lanishi o'zgaradimi?
3. Zanjirga katta quvatli dazmol ulansa, xonadagi lampalarning tolasini cho'g'lanishiga qanday tasir ko'rsatadi?
4. Xonadagi lampalarning quvvati bir xil bo'lsa, butun zanjiragi quvvat qanday bo'ladi?
5. Rasmdagi zanjir uchun qanday tokka mo'ljallangan eruvchan saqlagich tanlash lozim? (5A, 10A, 25A).

5-d rasmning yechimi



1.

2. Lampa cho'g'lanishi kamayadi, chunki eruvchan saqlagich o'rniga burab qo'yilgan lampa xonadondagi lampalar guruhi bilan ketma – ket ulanib qolishi natijasida lampadagi kuchlanish pasayadi.

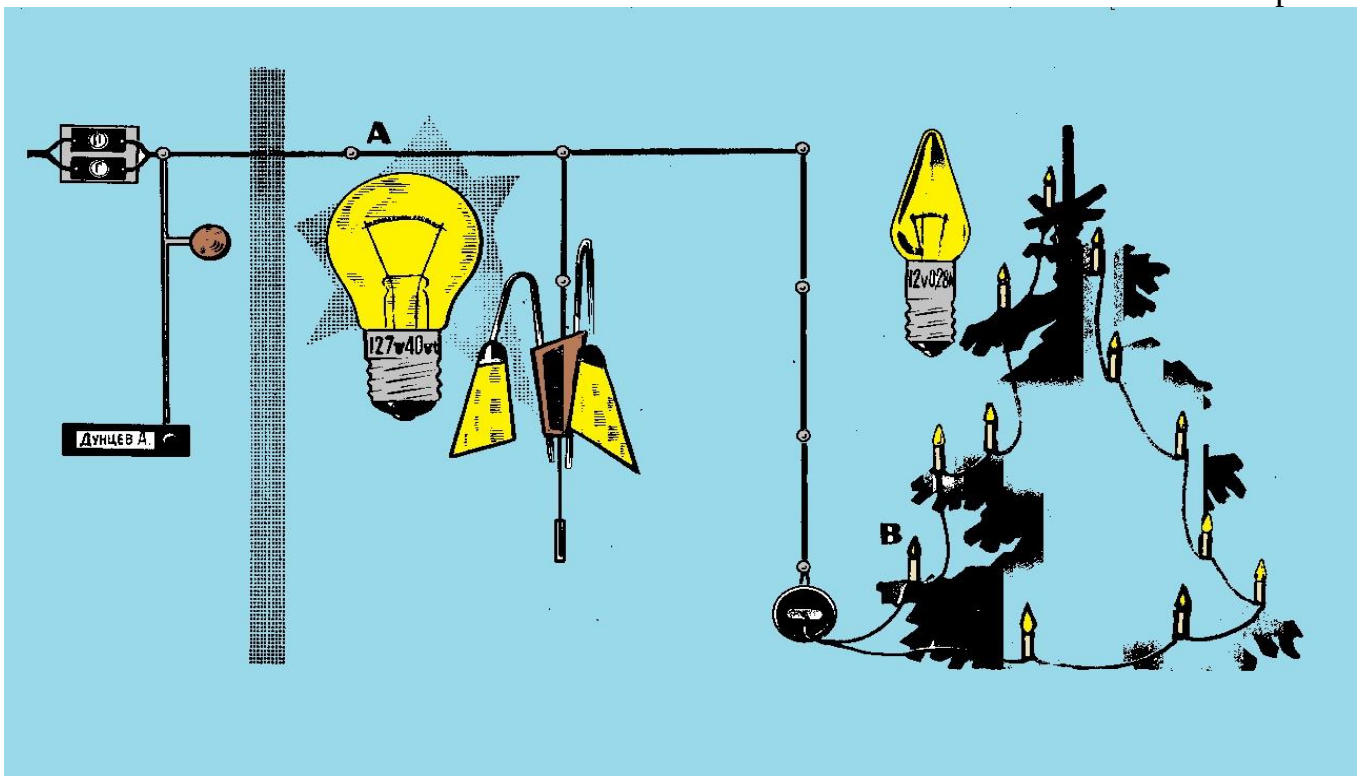
3. Elektr zanjirining ulanishi zanjir qarshiligining kamayishiga, bu esa tokning oshishiga olib keladi. Xonadonga kirish kuchlanishi qiymatini o'zgarmas deb

hisoblasak, tokning oshishi o'tkazgichlardagi kuchlanish tushuvining oshishiga, lampalarda esa kamayishiga olib keladi deb xulosa qilish mumkin. (Ketma – ket ulashda kuchlanishning taqsimlanishiga binoan).

4. P = 40 Vt 8 = 320 Vt.

5. 5 A ga mo'ljallangan eruvchan saqlagichlar tanlash lozim.

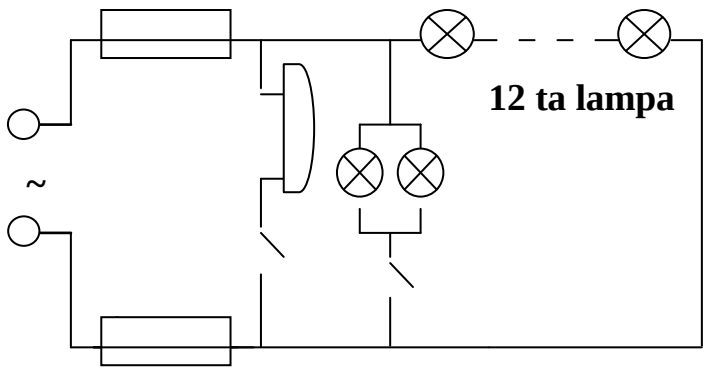
6-topshiriq



6 a rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. Agar B lampa kuyib qolsa nima bo'ladi?
3. Xonadagi barcha lampalarning umumiy quvvutini toping.
4. O'tkazgichning A nuqtasidagi tok qiymaini toping.
5. Svetilnik lampasini 220 V 40 Vt lampaga almashtirish mumkinmi?
6. Archadagi lampalardan bittasini 12 V 2.5A li lampa bilan almashtirish mumkinmi? Javobingizni tushuntiring.

1. **6–a rasmning yechimi**



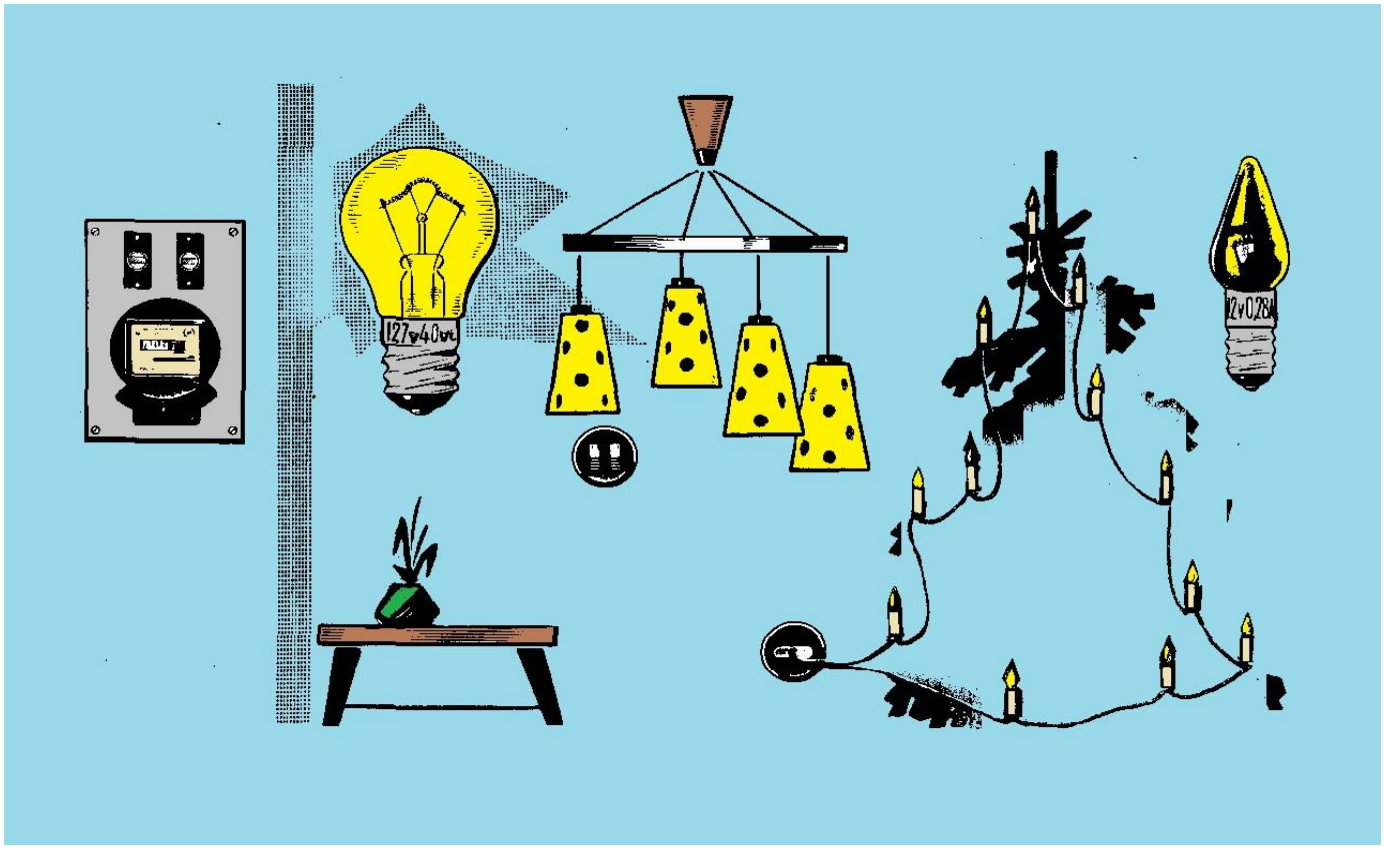
2. Archadagi hamma lampalar o'chadi.

3. P = 40 Vt 2 + 12 V 0,28 A 12 = 120,32 Vt.

4. $I = \frac{P}{U} = \frac{120.32Vt}{127V}$ = 0,9 A.

5. Mumkin, lekin u xira yonadi.

6. Mumkin, ammo bu lampalar archadagi har bir lampa qarshiligiga qaraganda kam qarshilikka ega bo'ladi. Shuning uchun lampada 12 V, 2,5 A bo'lib, kuchlanish tushuvi kam. Uning cho'g'lanish tolasi yetarli ravshanlikda yonmaydi. Shu bilan birga bu lampalarning ulanishi archadagi qolgan lampalardagi kuchlanishning oz miqdorda oshishiga olib keladi.

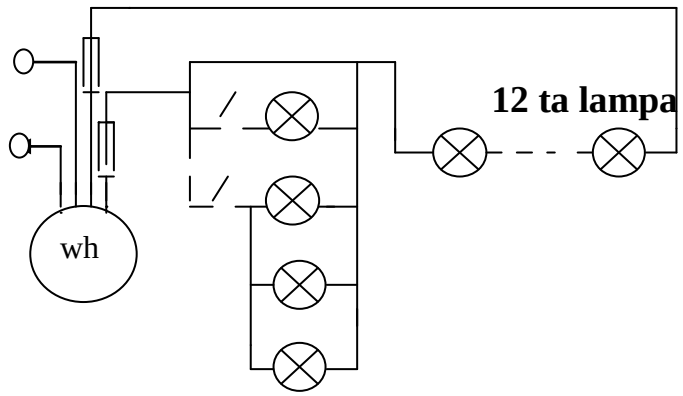


6 b rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. Agar archadagi lampalardan bittasi kuyib qolsa nima bo'ladi?
3. Xonadagi barcha lampalarning umumiy quvvutini qancha bo'ladi?
4. Hisoblagichdan o'tayotgan maksimal tokni toping.
5. Qandilning bitta lampasini 220 V 60 Vt li lampa bilan almashtirish mumkinmi?
6. Archadagi lampalardan bittasini 12 V 0.1A ga mo'ljallangan lampa bilan almashtirish mumkinmi? Javobingizni asoslang.

6-b rasmning yechimi

1.



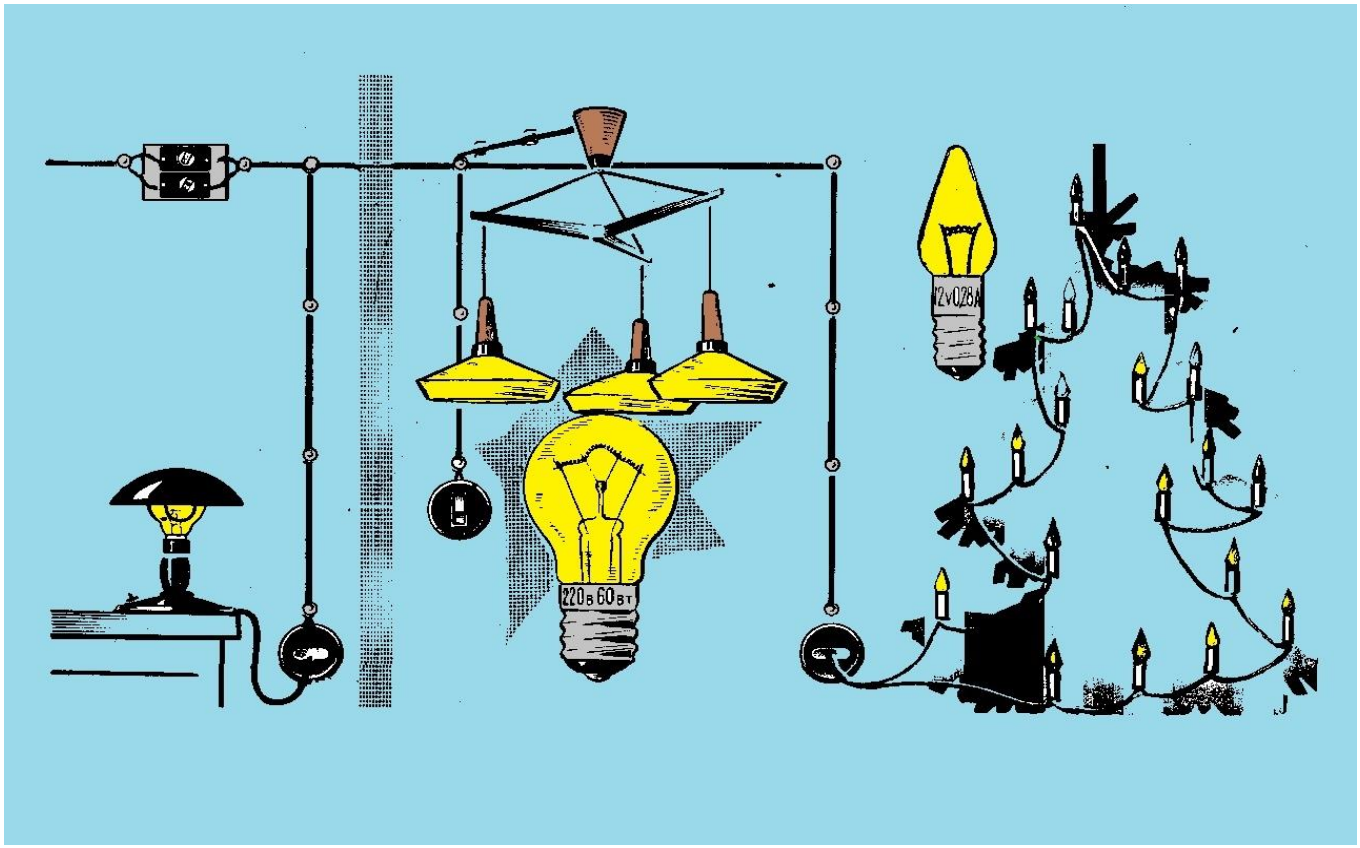
2. Archadagi barcha lampalar o'chadi.

3. P = 40 Vt 4 + 12 V 0,28 A 12 = 200,32 Vt

4. $I = \frac{P}{U} = \frac{200.32Vt}{127V} =$ 1,6 A.

5. Mumkin.

6. Yo'q, bu lampa kattaroq qarshilikka ega. Tokka ulanganda undagi kuchlanish yo'l qo'yilishi mumkun bo'lgan kuchlanishdan katta bo'lib lampa kuyadi.

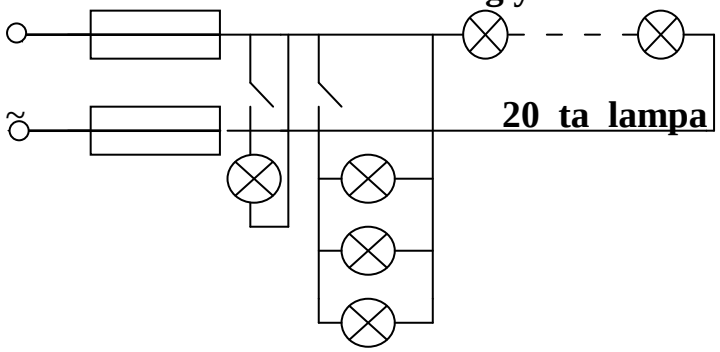


6 c rasm

1. Rasmdagi elektr zanjirning prinsipial sxemasini chizing.
2. Agar archadagi lampalardan bittasi kuysa nima bo'ladi?
3. Agar lampalarning barchasi bir xil bo'lsa, ularning umumiy quvvatini toping?
4. Eruvchan saqlagichdan o'tayotgan maksimal tokni toping.
5. Qandildagi lampalardan bittasini 127 V 60 Vt li lampa bilan almashtirish mumkinmi?

6. Agar archadagi lampalardan bittasi kuyib qolsa, uning patronidagi kontaktlarni qisqa tutashtirish mumkinmi.

1. **6-c rasmning yechimi**



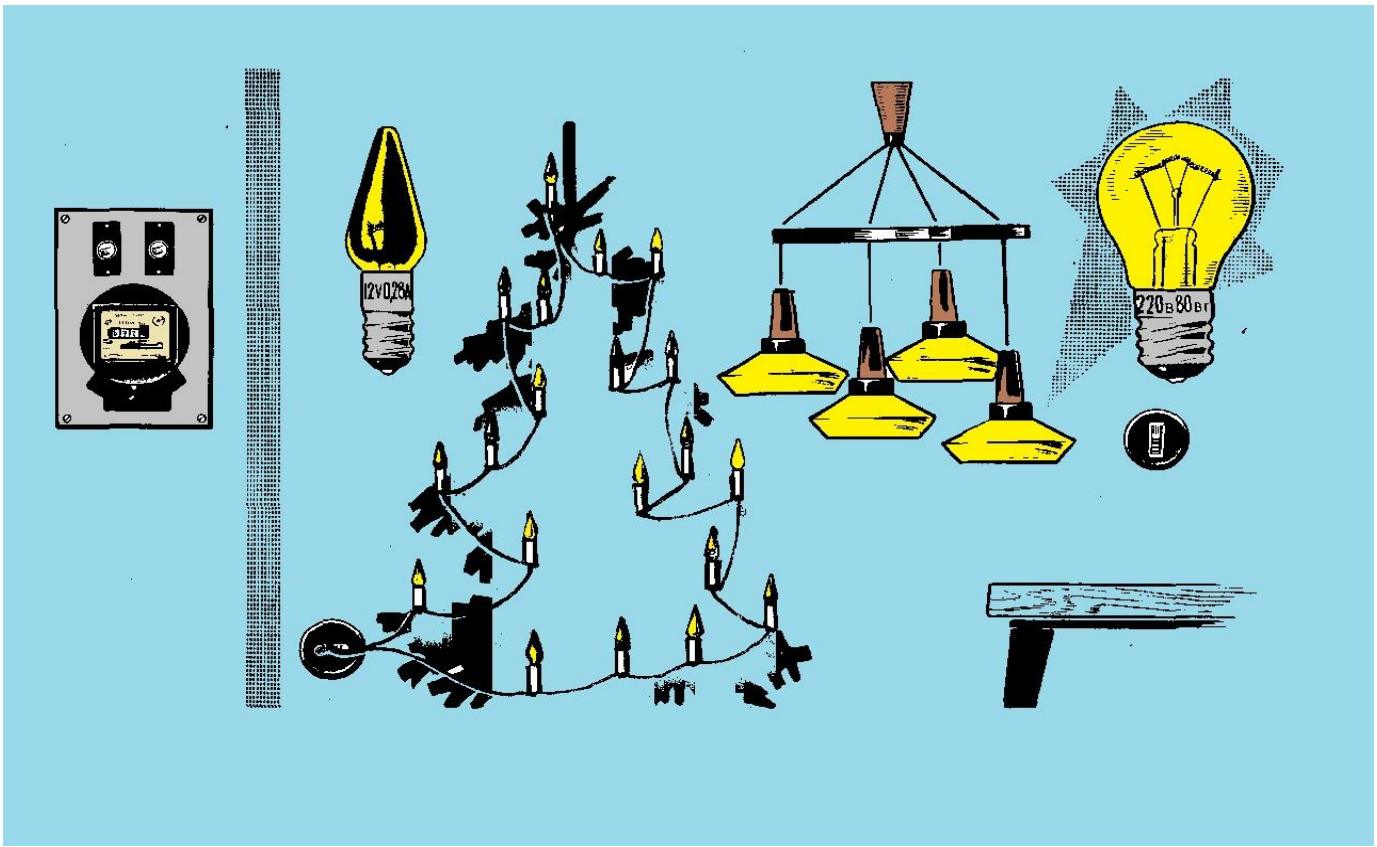
2. Archadagi barcha lampalar o’chadi.

3. P = 60 Vt 4 + 12 V 0.28 A 20 = 307,2 Vt.

4. $I = \frac{P}{U} = \frac{307.2Vt}{220V}$ = 1,4 A.

5. Yo’q. Kuyadi.

6. Mumkin, chunki bu lampalardagi kuchlanishning sezilarli oshishiga olib kelmaydi, Biroq, ularning xizmat qilish davrini bir necha marta cheklaydi

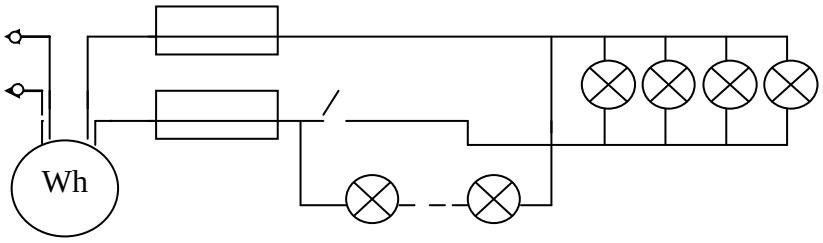


6 d rasm

1. Rasmdagi zanjirning prinsipial sxemasini chizing.
2. Archadagi lampalardan bittasi kuyib qolsa nima bo’ladi?
3. Rasmdagi barcha lampalarning umumiy quvvutini toping?
4. Elektr energiya hisoblagichdan o’tayotgan tokning maksimal qiymatini toping.
5. Qandil lampalaridan birini 127 V 60 Vt li lampa bilan almashtirish mumkinmi?
6. Archadagi girlyandani 127 V kuchlanishga qanday ulash mumkin?

6-d rasmning yechimi

1.



20 ta lampa

2. Qandil va archadagi qolgan barcha lampalar normal yonadi.

3. P = 80 Vt 4 + 12 V 0,28 A 20 = 387,2 Vt.

4. I $=\frac{387.2Vt}{220V}$ = 1,76 A.

5. Yo'q, kuyadi.

6. Archa girlyandasini lampalar soni teng bo'lgan ikkita parallel tarmoqli zanjirga ajratib ulash lozim.

7 topshiriq

7 a rasm

1. 30 kun ichidagi elektroenergiya sarfini hisoblang.
2. Sarflangan elektroenergiya narxini hisoblang.
3. Hisoblagich diskining bitta aylanishiga mos elektroenergiyasini aniqlang.
4. Hisoblagichga ulanishi mumkin bo'lgan iste`molchilarning maksimal quvvatini toping.
5. Sarflangan elektro energiyani kichik qismini kVt soatning 1/100 ulushlarida qanday aniqlash mumkin?

7-a rasmning yechimi

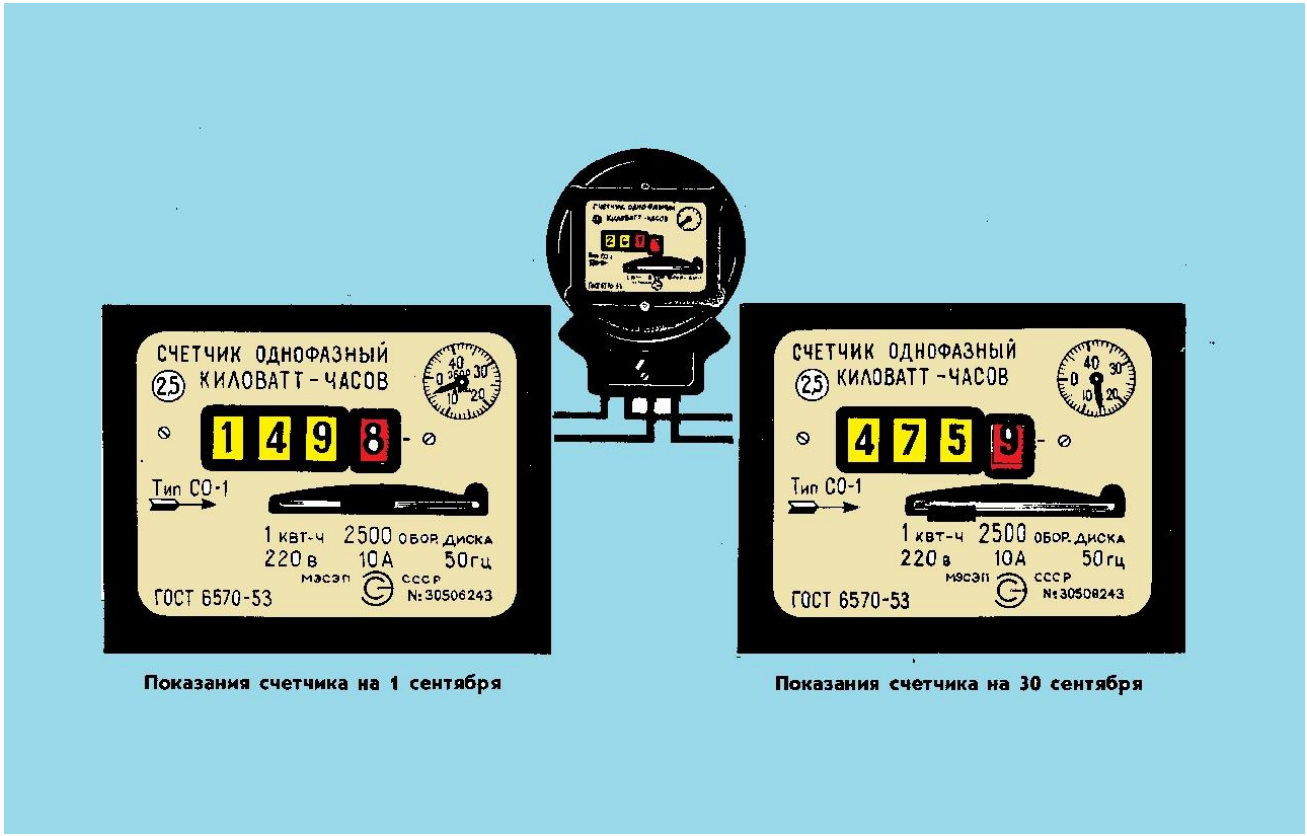
1. A = 563,4 kVt soat - 382,5 kVt soat = 180,9 kVt soat.

2. Elektroenergiya qiymati =180,9 kVt soat 60 so'm =10854 so'm

3. $A_{ayl} = \frac{1kVt\ soat}{2500ayl} = \frac{1000Vt3600s}{2500ayl} = 1440\frac{Vt\ s}{ayl}$

4. P = U I = 220 V 5 A = 1100 Vt.

5. Sarflangan elektr energiyasining kichik qismini hisoblagich diskining aylanishlari soni bo'yicha o'lchash mumkin.



Показания счетчика на 1 сентября

Показания счетчика на 30 сентября

7 b rasm

1. 30 kun ichidagi elektroenergiya sarfini toping.
2. Sarflangan elektroenergiya narxini hisoblang.
3. Hisoblagich diskining bitta aylanishiga mos keluvchi elektroenergiya qiymatini toping.
4. Rasmdagi hisoblagichga ulanishi mumkin bo'lgan istemolchilarning umumiy quvvatini toping.
5. Sarflangan elektroenergiya kichik ulushini kVt soatning 1/100 ulushlarida qanday aniqlash mumkin?

7-b rasmning yechimi

1. A = 475,9 kVt soat - 149,8 kVt soat = 326,1 kVt soat.

2. Elektroenergiya narxi = 326,1 kVt soat 60 so'm = 19566 so'm.

3. $A = \frac{1kVt\ soat}{2500ayl} = \frac{1000Vt3600s}{2500ayl} = 1440\frac{Vt\ s}{ayl}$

4. P = I U = 10 A 220 V 2,2 kVt.

5. Sarflangan elektr energiyasini kichik qismini hisoblagich diskining aylanishlari soni bo'yicha o'lchash mumkin.

c rasm

1. 30 kun ichidagi elektroenergiya sarfini hisoblang.
2. Sarflangan elektroenergiyaning narxini hisoblang.
3. Hisoblagich diskining bitta aylanishiga mos kelgan elektroenergiyasini hisoblang.
4. Rasmdagi hisoblagichga ulanishi mumkin bo'lgan iste`molchilarning umumiy quvvatini toping.
5. Sarflangan elektroenergiyaning kichik ulushini kVt soatning 1/100 ulushlarida qanday aniqlash mumkin?

7–c rasmning yechimi

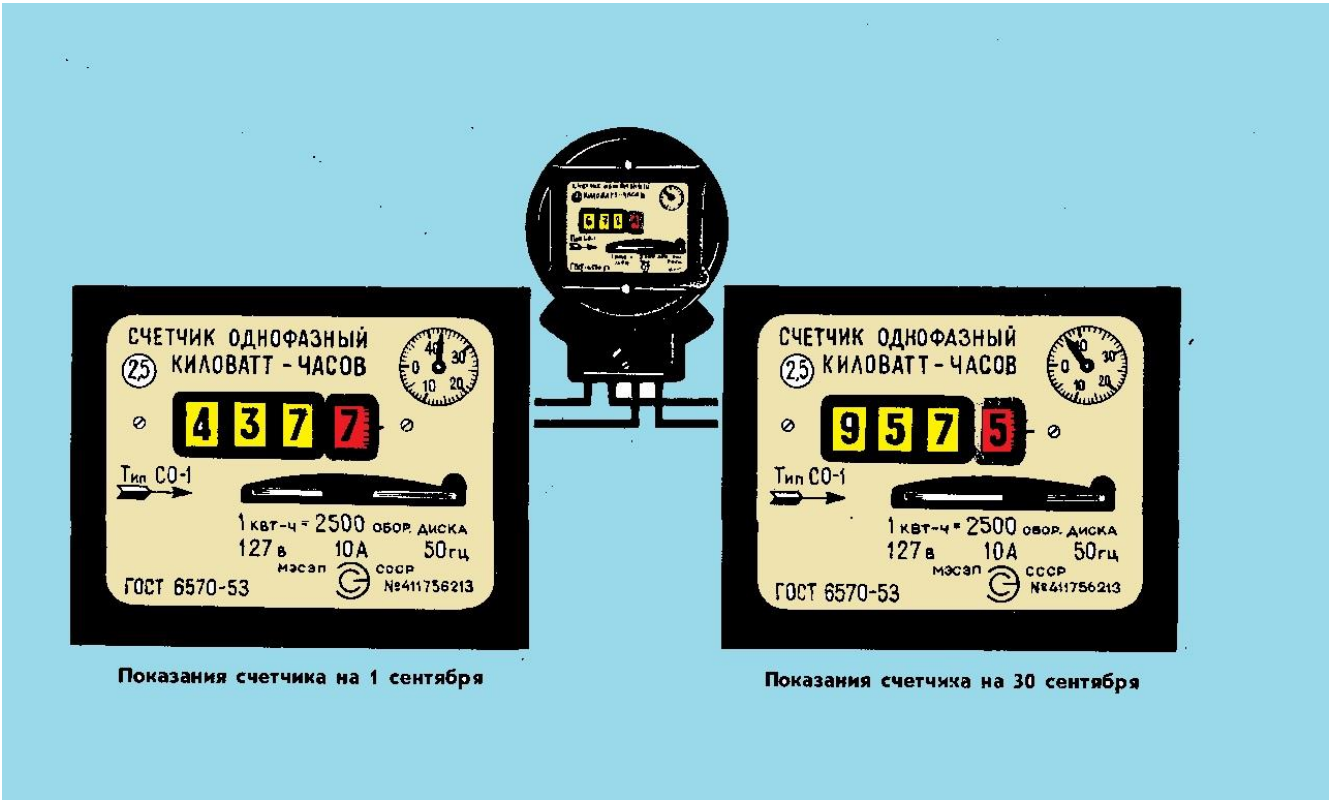
1. A = 827,9 kVt soat – 248,4 kVt soat = 579,5 kVt soat.

2. Elektroenergiya narxi = 579,5 kVt soat 60 so'm = 34770 so'm.

3. $A_{ayl} = \frac{1kVt\ soat}{2500ayl} = \frac{1000Vt3600s}{2500ayl} = 1440\frac{Vt\ s}{ayl}$

4. p = I U = 5 A 127 V = 635 Vt.

5. Sarflangan elektroenergiyasining kichik qismini hisoblagich diskining aylanishlari soni bo'yicha o'lchash mumkin.



7 d rasm

1. 30 kun ichidagi elektroenergiya sarfini hisoblang.

2. Sarflangan elektroenergiya narxini hisoblang.
3. Hisoblagich diskining bitta aylanishiga mos keluvchi elektroenergiyani qiymatini toping.
4. Hisoblagichga ulanishi mumkin bo'lgan iste`molchilarning maksimal quvvatini toping.
5. Sarflangan elektroenergiyaning kichik ulushini kVt soatning 1/100 ulushlarida qanday aniqlash mumkin?

7-d rasmning yechimi

1. A = 957,5 kVt soat - 437,7 kVt soat = 519,8 kVt soat.

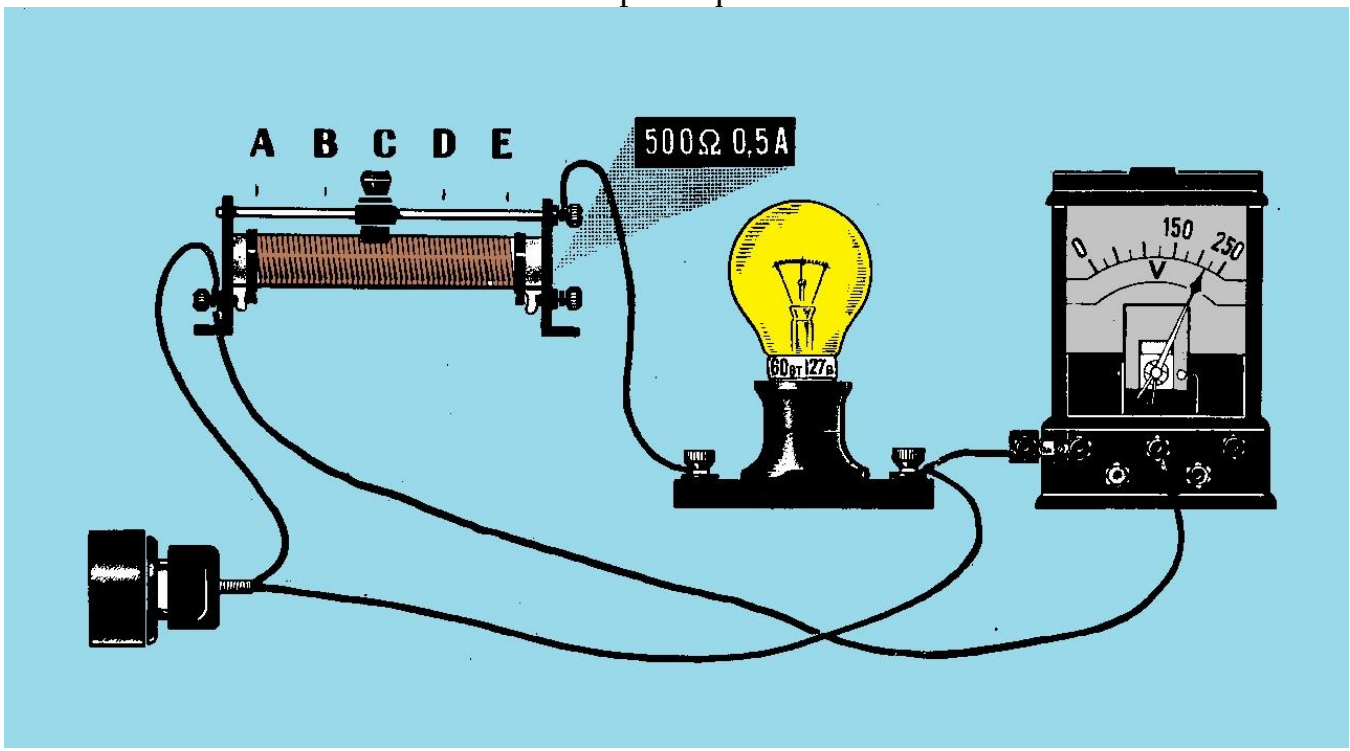
2. Elektroenergiya narxi :=519,8 kVt soat 60 so'm =31188 so'm.

3. $A_{ayl} = \frac{1kVt\ soat}{2500ayl} = \frac{1000Vt3600s}{2500ayl} = 1440\frac{Vt\ s}{ayl}$

4. P = I U = 10 A 127 V = 1270 Vt.

5. Sarflangan elektr energiyasining kichik qismini hisoblagich diskining aylanishlari soni bo'yicha o'lchash mumkin.

8-topshiriq



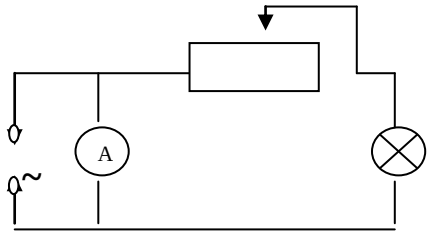
8 a rasm

1. Rasmdagi elektr zanjirining prinsipial sxemasini chizing?
2. Reostatning vazifasini tushuntiring?
3. Lampaning normal yonishi uchun reostat surgichi qanday xolatda bo'lishi mumkin?
4. Lampadagi kuchlanishni reostat yordamida qanday oraliqda o'zgartirish mumkin?
5. Tasvirlangan reostat berilgan zanjirga ulanishi mumkinmi? Javobingizni asoslang.

6. Reostat surgichini qanday xolatida zanjirdagi quvvat minimal bo'ladi? Javobingizni asoslang?

8–a rasmning yechimi

1.



2. Reostat vazifasi-lampadagi kuchlanishni boshqarishdan iborat.

3. Bu savolga javob berish uchun birinchi o'rinda lampa qarshiligini uning pasportidan aniqlash lozim, ya'ni:

$$R_L = \frac{U^2}{P} = \frac{(127V)^2}{60Vt} = 270\ \Omega.$$

Agar tarmoq kuchlanishi 220 V bo'lsa, (voltmeter ko'rsatishiga qarang) u holda lampaning normal yonishi uchun reostat 93 V kuchlanishni so'ndirishi kerak.

Ammo ketma-ket ulanishda kuchlanish zanjir qismlaridagi qarshilikka proporsional taqsimlanadi. Shuning uchun:

$$\frac{127V}{270\Omega} = \frac{93V}{R_R} \qquad R_R = 200\ \Omega.$$

Reostat 200 qarshilikka ega bo'lishi uchun uning surilma kontakti B va C nuqtalar orasida turishi kerak.

4. Lampadagi kuchlanish o'zgarishining yuqori qiymati uning pasportida ko'rsatilgan bo'lib, 127 V ga teng. Quyi qiymati reostat qarshiligining maksimal ulanishi natijasida aniqlanadi. Bunda zanjirning to'la qarshiligi 500 Ω + 270 Ω = 770 Ω.

Reostatning to'la qarshiligida zanjirdagi tok qiymati quyidagicha aniqlanadi:

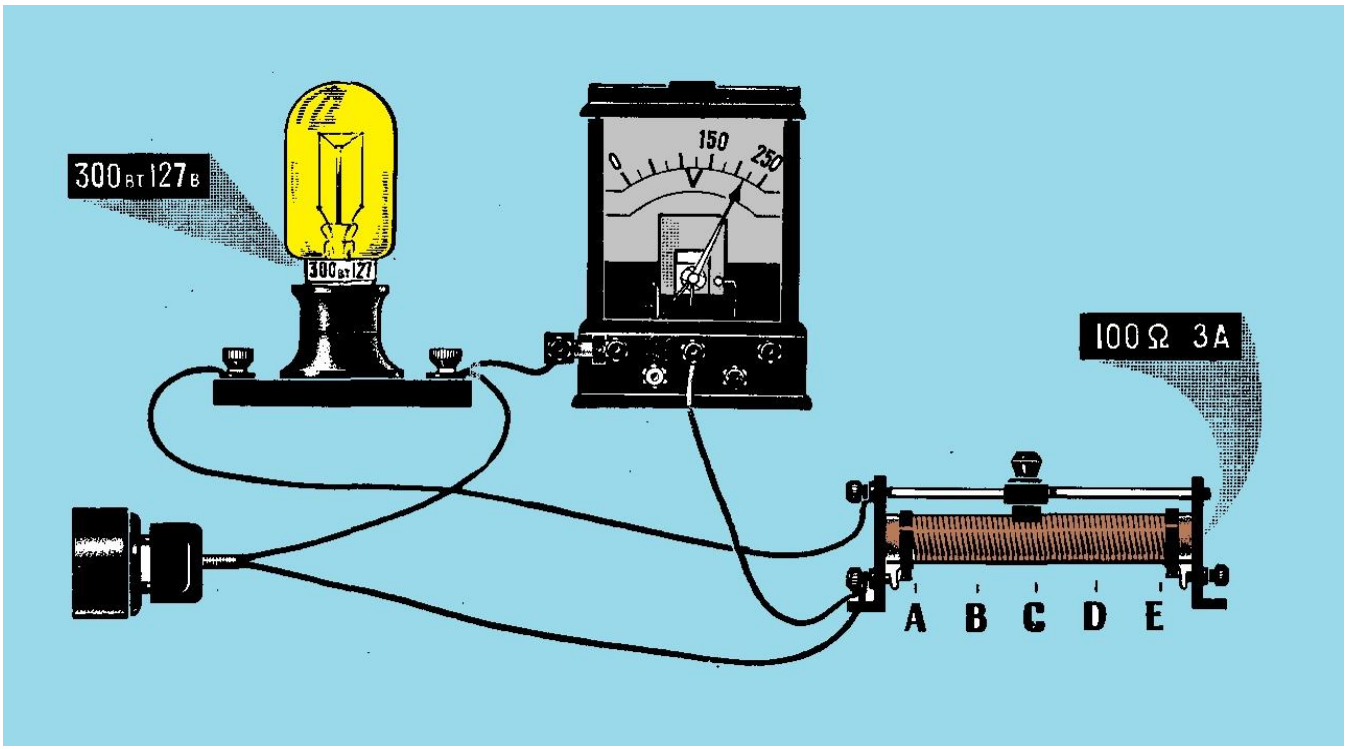
$$I = \frac{220V}{770\Omega} = 0{,}3\ A.$$

Lampadagi kuchlanishning quyi qiymati:

$$U = I\,R_L = 0{,}3\ A \cdot 270\ \Omega = 81\ V.$$

5. Mumkin. Chunki rheostat uchun qo'yilishi mumkin bo'lgan maksimal tok 0,5 A bo'lib, lampaning normal toki 0,4 A dan kich

6. $P = \frac{U^2}{R}$ formulaga binoan, zanjir qarshiligi maksimal R bo'lib, reostat surgichi A nuqtada turganda zanjirdagi quvvat minimal bo'ladi.

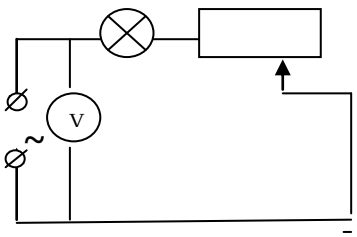


8 b rasm

1. Rasmdagi elektr zanjirining prinspial sxemasini chizing.
2. Zanjirdagi reostat vazifasi nimadan iborat?
3. Lampani normal yonishi uchun reostat surguchi taxminan qanday xolatda bo'lishi kerak?
4. Reostat yordamida lampadagi kuchlanishni qanday oraliqda o'zgartirish mumkin?
5. Rasmda tasvirlangan reostat ushbu zanjirga ulanishi mumkinmi? Javobingizni asoslang.
6. Lampani normal yongan xolatidagi zanjir quvvatini toping.

8-b rasmning yechimi

1.



2. Reostatdagi kuchlanishni kamaytiradi.

3. Lampa qarshiligini uning pasportida ko'rsatilgan kattaliklardan foydalanib oldindan topish zarur:

$$R_L = \frac{U^2}{P} = \frac{(127V)^2}{300Vt} = 54\ \Omega.$$

Agar tarmoq kuchlanishi (voltmetr ko'rsatishiga qarang) 220 V ga teng bo'lsa, u holda lampaning normal yonishi uchun reostat 93 V kuchlanishni so'ndirishi kerak. Kuchlanishni zanjirning ketma-ket ulangan qismlaridagi qarshilikka proporsional taqsimlanishini hisobga olsak, u ho

$$\frac{127V}{54\Omega} = \frac{93V}{R_R};\qquad R_R = 40\ \Omega$$

Reostatdagi qarshilik 40 bo'lshi uchun uning surilma kontakti B va C nuqtalar orasida turishi kerak.

4. Kuchlanish o'zgarishining yuqori qiymati lampaning passport ko'rsatkichida berilgan bo'lib, 127 V ga teng. Quyi qiymati rheostat qarshiligining maksimal ulanishi bilan aniqlanadi. Bunda butun zanjir qarshiligi: 100 Ω + 54 Ω = 154 Ω bo'ladi. Reostatning to'la qarshiligida zanjirdagi tok kattaligi quyidagicha aniqlanadi:

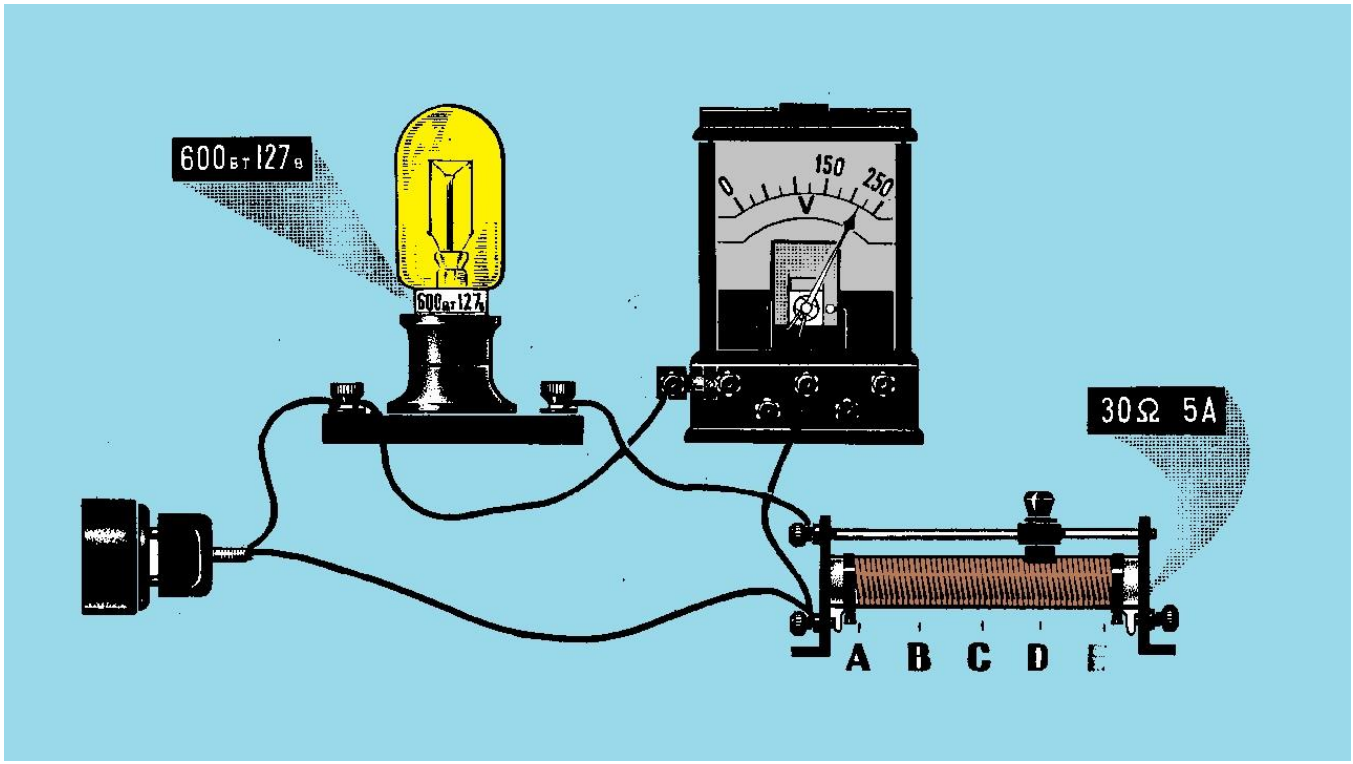
$$I = \frac{220V}{154\Omega} = 1{,}4\ A$$

Lampadagi kuchlanishning quyi qiymati :

$$U = I R_L = 1{,}4\ A\ 54\ \Omega = 75{,}6\ V.$$

5. Mumkun, chunki reostatdan o'tishi mumkun bo'lgan tok qiymati 3 A, lampadan o'tishi mumkun bo'lgan tok qiymati 2,4 A dan kichik.

6. $P = I\ U_Z = \frac{P}{U} U_Z = \frac{300Vt}{127V} 220\ V = 530\ Vt.$

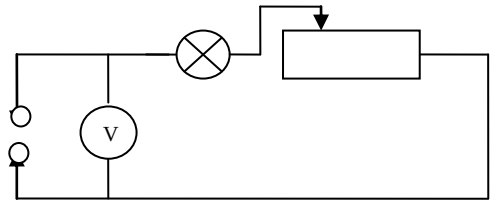


8 c rasm

1. Rasmda tasvirlangan elektr zanjirining prinspial sxemasini chizing.
2. Zanjirdagi reostat vazifasi nimadan iborat?
3. Zanjir ulanishidan oldin reostat surgichi qanday xolatda bo'lishi mumkin?
4. Reostat yordamida lampadagi kuchlanishni qanday oraliqda o'zgartirish mumkin?
5. Sxemada tasvirlangan reostat ushbu zanjirga ulanishi mumkinmi? Javobingizni asoslang.
6. Lampadagi kuchlanishni normal xolidagi quvvatini toping.

8-c rasmning yechimi

1.



2. Reostat lampadagi kuchlanishni kamaytiradi.

3. Reostat surgichi shunday holatda joylashgan bo'lishi kerakki, bunda lampadagi kuchlanish 127 V dan oshmasligi kerak. Tarmoq kuchlanishi 220 V bo'lganda reostatda 93 V kuchlanish so'ndirilishi kerak. Reostatning ulangan qismining qarshiligini aniqlash uchun oldin lampa qarshiligini uning pasportida ko'rsatilgan kattaliklardan foydalanib aniqlash zarur:

$$R_L = \frac{(127V)^2}{600Vt} = 27\ \Omega.$$

Endi ketma – ket ulangan qarshiliklarda kuchlanishning taqsimlanishi qonuniga asoslanib, reostatning tok o'tayotgan qismidagi qarshiligini topamiz:

$$\frac{127V}{27\Omega} = \frac{93V}{R_R}\ ; \qquad R_R = 20\ \Omega\ .$$

Reostatning tok o'tayotgan qismi 20 Ω qarshilikka ega bo'lishi uchun, uning surgichini C va D nuqtalar orasiga o'rnatish kerak.

4. Lampadagi kuchlanish o'zgarishining yuqori qiymati uning pasportida 127 V ekanligi berilgan, quyi qiymati esa reostat qarshiligidan maksimal foydalanish orqali o'rnatilad. Bunda zanjir qarshiligi:

$$R_Z = 27\ \Omega + 30\ \Omega = 57\ \Omega.$$

Reostatning maksimal qarshiligida zanjirdagi tokning qiymati quyidagicha aniqlanadi:

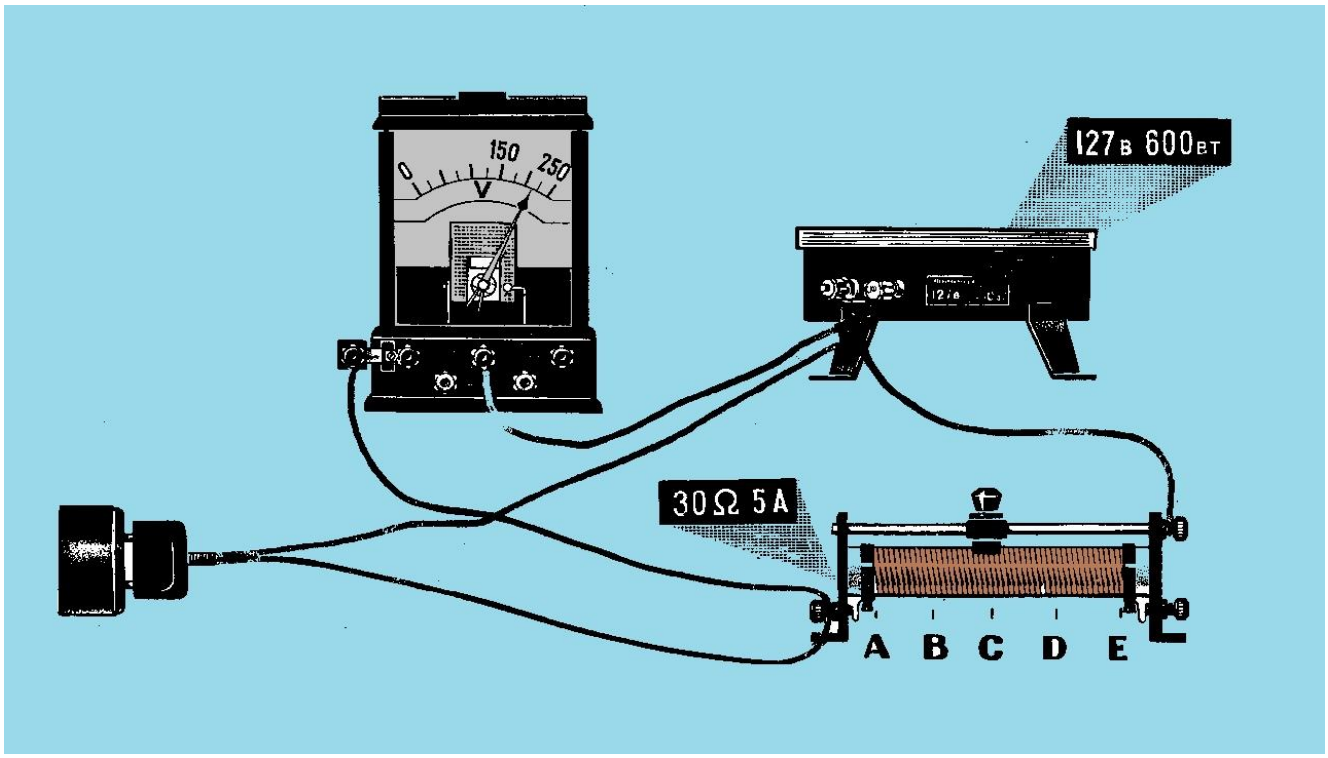
$$I = \frac{220V}{57\Omega} = 4\ A$$

Lampadagi kuchlanish o'zgarishining quyi qiymati:

$$U = I R_L = 4\ A \cdot 27\ \Omega = 108\ V.$$

5. Mumkin, chunki reostatga qo'yilishi mumkin bo'lgan 5 A tok lampadagi tok qiymati 4,7 A dan kichik.

6. $P = I\ U_Z = \frac{P}{U} U_Z = \frac{600Vt}{127V}\ 220\ V = 1034\ Vt.$

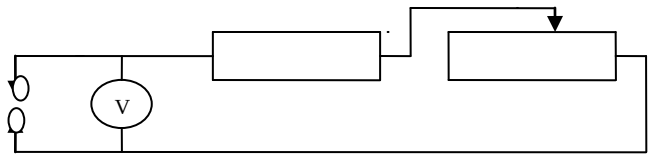


8 d rasm

1. Rasmdagi elektr zanjirining prinsipial sxemasi chizing.
2. Sxemadagi reostat vazifasini tushuniring.
3. Zanjir ulanishidan oldin reostat surgichi taxminan qanday xolatda bo'lishi kerak?
4. Reostatga qo'yilishi mumkin bo'lgan maksimal kuchlanishni aniqlang.
5. Sxemada tasvirlangan reostat ushbu zanjirga ulanish mumkinmi? Javobingizni asoslang.
6. Elektr plitadagi kuchlanishni normal xolidagi quvvatini toping.

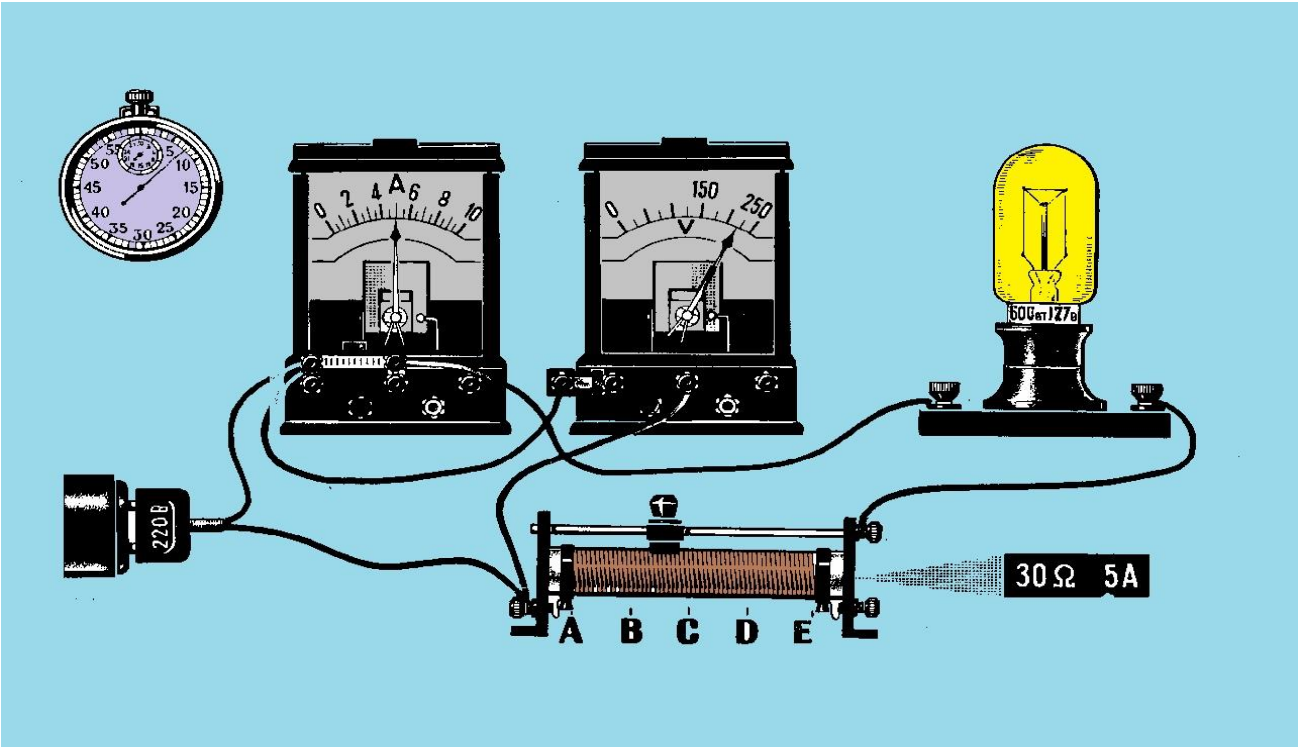
8-d rasmning yechimi

1.



2, 3, 4 , 5, 6 - topshiriqlarning javoblari oldingi topshiriqlarni javoblari bilan bir xil. Chunki, lampalar o'rniga ularning quvvatlariga mos bo'lgan elektr plitasi o'rnatilgan.

9-topshiriq

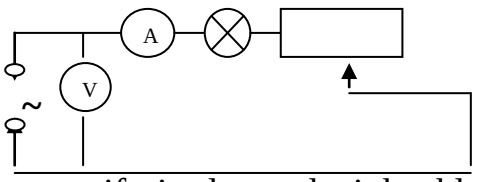


9 a rasm

1. Rasmdagi zanjirning prinsipial elektr sxemasini chizing.
2. Sxemadagi reostat vazifasini tushuntiring.
3. Reostat surgichining lampani normal yonishini taminlovchi xolatini toping? Javobingizni asoslang.
4. O'lchov asboblarining ko'rsatishi yordamida berilgan zanjir uchun qanday kattaliklarni anqlash mumkin?
5. O'lchov asboblarining ko'rsatishidan foydalanib lampa qisqichlaridagi kuchlanishni toping.
6. Zanjir va sekundomer bir vaqtda ishga tushurilgan xolda lampadagi elektroenergiya sarfini hisoblang?

9–a javob

1.



2. Reostatning vazifasi - lampadagi kuchlanishni boshqarish.

3. Lampa qarshiligini oldindan topamiz:

$$R_L = \frac{(127V)^2}{600Vt} = 27\ \Omega\ .$$

Ketma – ket ulangan qarshiliklarda kuchlanishning taqsimlanish qonuniga asosan, reostatning ishchi qismidagi qarshilik qiymatini topamiz. Bunda, lampalarning normal yonishi uchun reostatda 93 V kuchlanish so'ndirilishi lozim, ya'ni:

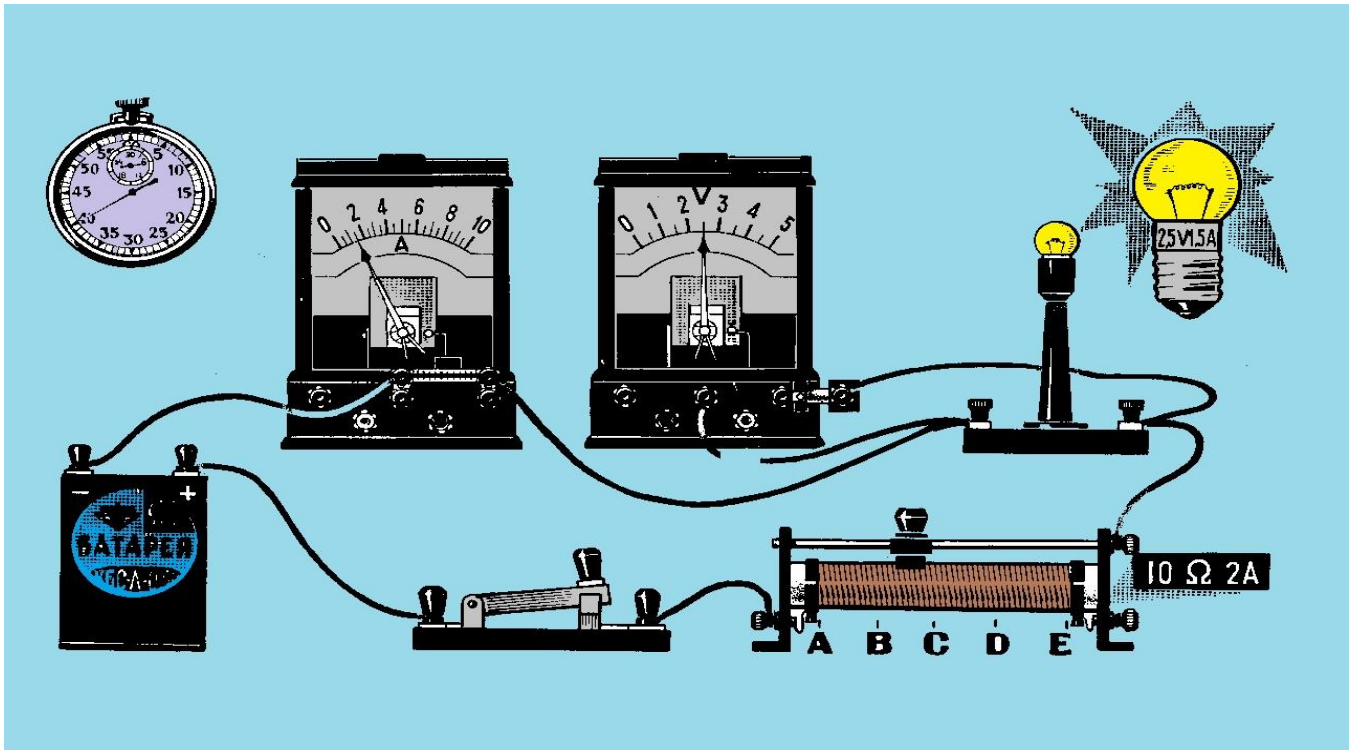
$$\frac{127V}{27\Omega} = \frac{93V}{R_R} \quad R_R = 20\ \Omega$$

Shu bilan birga, reostat surgichi D nuqta yaqinida turishi kerak.

4. Zanjirdagi tok va kuchlanishni, shu bilan birga zanjirning ishlash vaqtini to'g'ridan to'g'ri o'lchash mumkin. Zanjir, lampa va reostat qarshiligini; lampa va reostatdagi kuchlanishni; zanjirning, lampaning va reostatning quvvatini; zanjirdagi, lampadagi va reostatdagi sarflangan elektroenergiyasini hisoblash mumkin.

5. $U_L = I R_L = 5\ A\ \ 27\ \Omega = 135\ V.$

6. $A = U_L I_t = 135\ V\ \ 5\ A\ \ 187{,}5\ s = 35\ Vt$ soat.

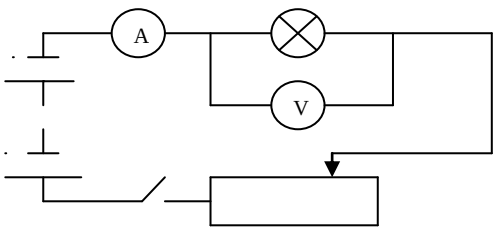


9 b rasm

1. Rasmdagi elektr zanjirining prinsipial sxemasini chizing.
2. Zanjirdagi reostat vazifasini tushuntiring.
3. Lampaning normal yonishini taminlovchi reostat surgichini taxminiy xolatini ko'rsating va javobingizni asoslang.
4. Zanjirda qo'llanilgan o'lchov asboblari yordamida qanday kattaliklarni aniqlash mumkin?
5. Zanjirdagi lampa qarshiligini toping.
6. Zanjir va sekundomer bir vaqtda ishga tushurilgan xoldagi lampadagi elektroenergiya sarfini hisoblang.

9-b rasmning yechimi

1.



2. Reostat vazifasi – lampadagi kuchlanishni rostlash.

3. Lampa qarshiligini uning pasportida ko'rsatilgan kattaliklardan foydalanib topamiz:

$$R_L = \frac{U}{I} = \frac{2.5V}{1.5A} = 1{,}7\ \Omega .$$

Manba kuchlanishini 4,5 V deb hisoblasak, (aslida bu kuchlanish EYuKdan kichik) lampadagi normal kuchlanish 2,5 V da reostat 2 V kuchlanishni so'ndirishi kerak. U holda, reostatning ishchi qismidagi qarshilikni qiymati R quyidagicha aniqlanadi:

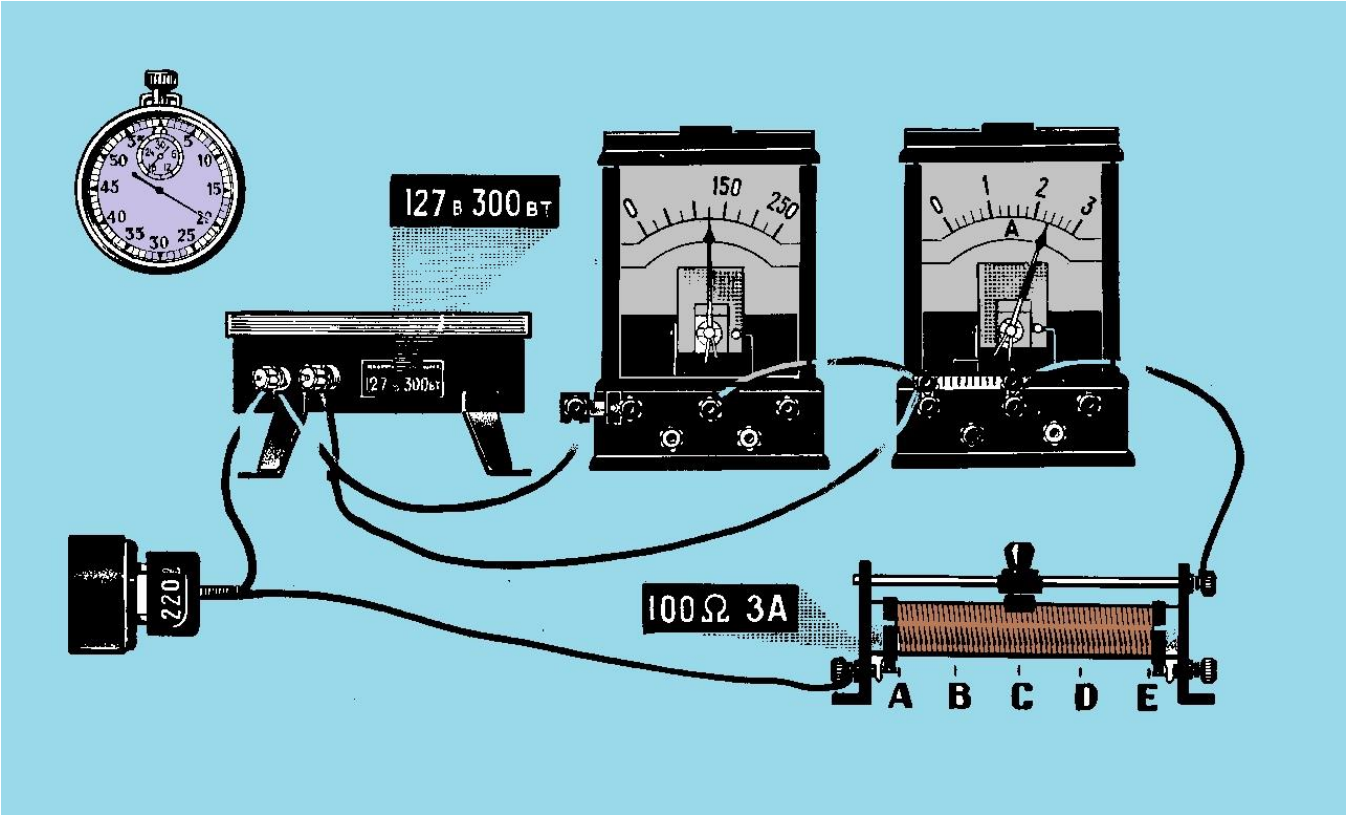
$$R_R = \frac{U}{I} = \frac{2V}{1.5A} = 1{,}3\ \Omega .$$

Bu esa reostat surgichining holati A va B nuqtalar orasiga to'g'ri keladi.

4. Zanjirdagi tok, lampadagi kuchlanish va zanjirning ishlash vaqtini bevosita o'lchash mumkun. Lampa qarshiligi, quvvati, lampa tamonidan sarf qilingan elektr energiyani hisoblash mumkin.

5. $R_L = \frac{U}{I} = \frac{2.5V}{1.5A} = 1{,}7\ \Omega$

6. A = I U t = 1,5 A 2,5 V 400 s = 1500 Vt s.



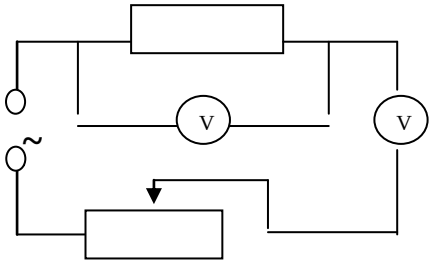
9 c rasm

1. Rasmdagi elektr zanjirning prinspial sxemasini chizing.
2. Zanjirga reostat nima maqsadda ulangan va u ko'zlangan maqsad uchun yaroqlimi?
3. Elektr isitgichning normal ishlashini taminlash uchun reostat surgichi qanday xolatda turishini ko'rsating.
4. Asboblar Yechimiida keltirilgan qiymatlar yordamida zanjirning qanday kattaliklarini aniqlash mumkin?
5. Elektr isitgich qisqichlaridagi kuchlanish va quvvatni aniqlang.

6. Sekundamer bilan bir vaqtda ishga tushurilgan isitgichdagi elektr energiya sarfini aniqlang.

9-c rasmning yechimi

1.



2. Reostat elektr plitasidagi kuchlanishni kamaytirish uchun zarur. Plitadagi tokni topamiz: $I = \frac{P}{U} = \frac{300Vt}{127V} =$ 2,3 A.

Reostatdagi tok 3 A ga teng. Demak, reostat ko'rsatilgan maqsad uchun yaroqli.

3. Elektr plitasining qarshiligini oldindan topamiz:

$$R = \frac{U^2}{P} = \frac{(127V)^2}{300Vt} = 54\ \Omega.$$

Reostat surgichi holatidan tarmoq kuchlanishi 220 V deb xulosa chiqarish mumkin. (Tarmoq kuchlanishi standart 127 V yoki 220 V ga teng).

Isitgichdagii kuchlanish normal bo'lganda, reostatdagi kuchlanish 220 V - 127 V = 93 V bo'lishi kerak. Elektr isitgichi va reostatning ketma – ket ulanganligini hisobga olsak, u holda proporsiya tuzish mumkin:

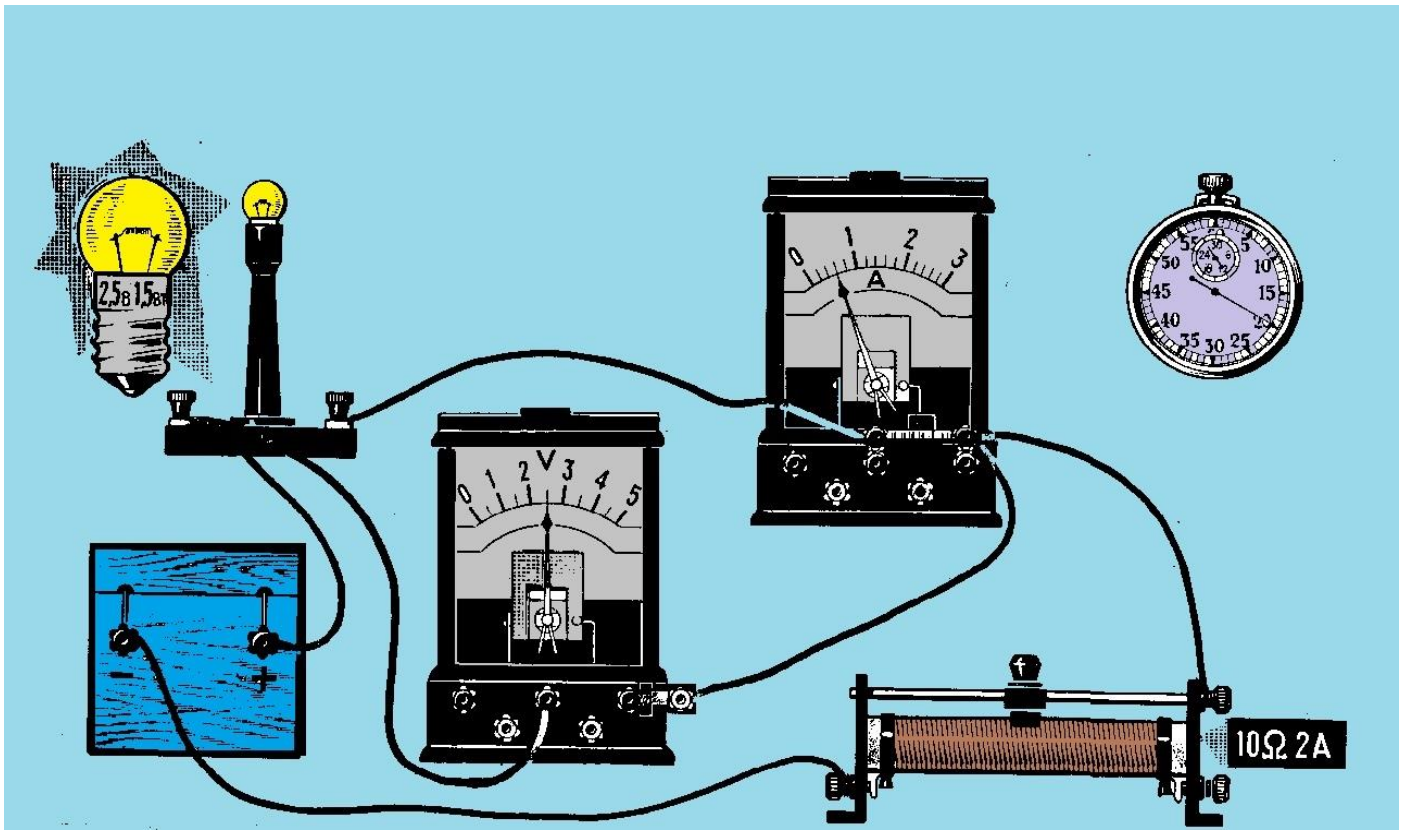
$$\frac{127V}{54\Omega} = \frac{93V}{R_R}; \qquad R_R = 40\ \Omega\ .$$

Reostatning bu qarshiligi uning surgichini B va C nuqtalar orasidagi xolatiga mos keladi.

4. Elektr isitgichi qisqichlaridagi kuchlanish, zanjirdagi tok, zanjirning ishlash vaqti o'lchanishi mumkin. O'lchash natijalaridan foydalanib, plita quvvatini, uning qarshligini, agarda sekundomer va isitgich bir vaqtda ishga tushirilgan bo'lsa, sarflangan elektr energiyasini hisoblash mumkin. Tarmoq kuchlanishi ma'lum bo'lgani uchun yuqoridagi kattaliklarni rheostat uchun ham topish mumkin.

5. $P = I\,U = 2{,}3\ A \cdot 125\ V = 287{,}5$ Vt.

6. $A = I\,U\,t = 2{,}3\ A \cdot 125\ V \cdot 1100s =$ 88 Vt soat.

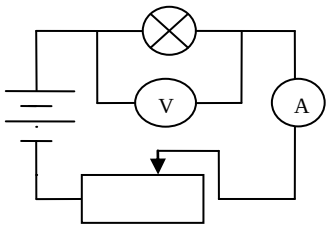


9 d rasm

1. Rasmdagi elektr zanjirining prinspial sxemasini chizing.
2. Zanjirdagi reostat vazifasi nimadan iborat?
3. Tok manbaidagi kuchlanishning taxminiy qiymatini ko’rsating.
4. Yechimidagi asboblardan keltirilgan qiymatlardan foydalanib, qanday kattaliklarni aniqlash mumkin?
5. Lampa qarshiligini aniqlang.
6. Zanjir bilan sekundomer bir vaqtda ishga tushurilgan bo’lsa, lampadagi elektr energiya sarfini toping.

9-d rasmning yechimi

1.



2. Reostat vazifasi zanjirdagi kuchlanishni boshqarish.

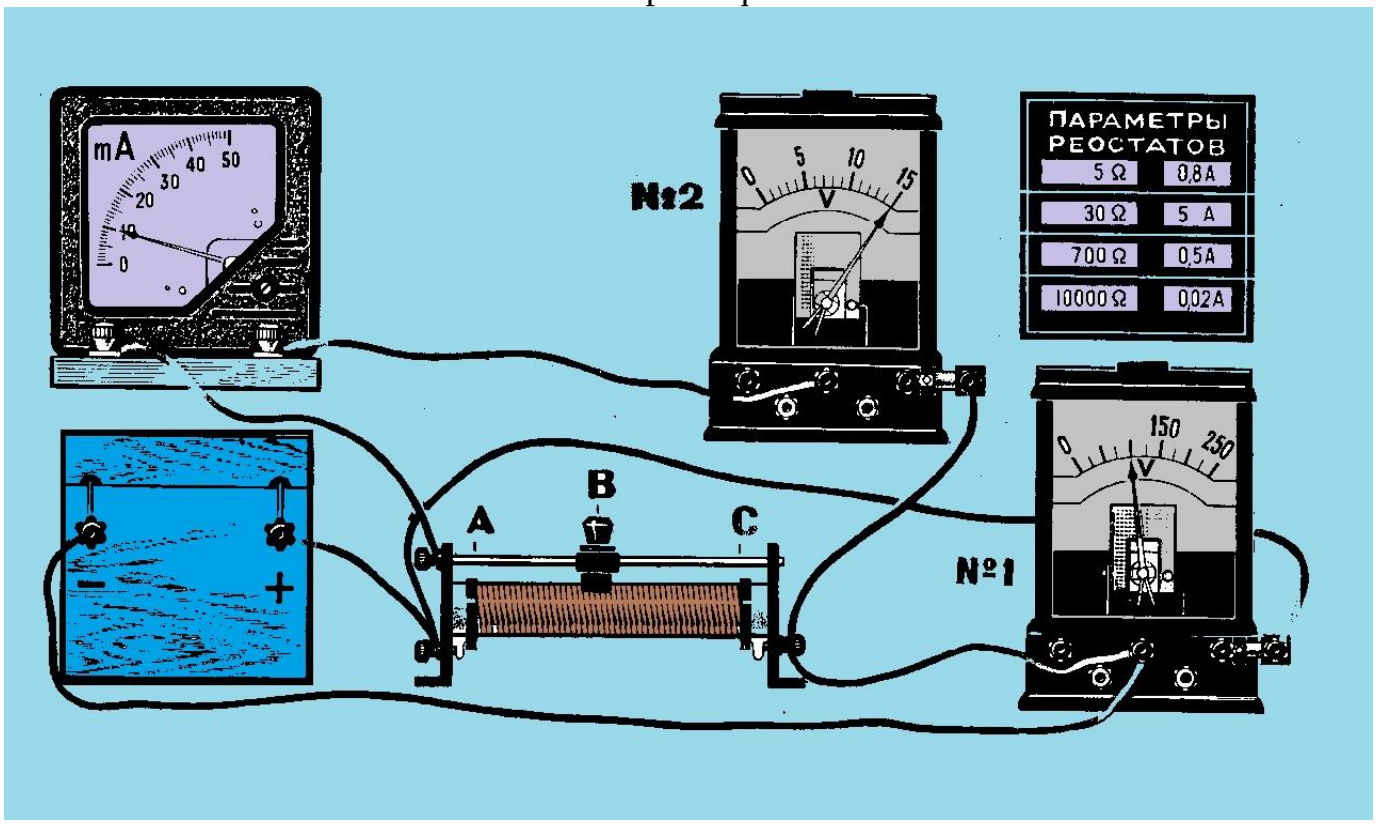
3. Tok manbaining qutblaridagi kuchlanish lampa va reostatdagi kuchlanishlarning yig’indisiga teng bo’ladi. Lampadagi kuchlanishni voltmeter ko’rsatadi, reostatdagi kuchlanish esa reostatning ishchi qismiga ulangan ampermetr ko’rsatgan 6 A tok qiymatidan foydalanib topilishi mumkin. Rasmdan ko’rinadiki, zanjirga reostat qarshiligining yarmisi, ya’ni 5 Ω ulangan. Bundan kelib chiqadiki, reostatdagi kuchlanish taxminan 0,6 A 5 Ω = 3 V ga teng bo’ladi. U holda tok manbaidagi kuchlanish quyidagicha bo’ladi: 3 V + 2,5 V = 5,5 V.

4. Lampadagi tok va kuchlanishni bevosita o'lchash mumkin. Sekundomer yordamida zanjirning ishlash vaqtini o'lchash mumkin. O'lchash natijalaridan foydalanib, lampa quvvati va qarshiligini, sarflangan elektr energiyasini hisoblash mumkin. Shu kabi kattaliklarni taxminiy qiymatini reostat uchun ham topish mumkin.

5. $R_L = \frac{U^2}{P} = \frac{(2.5V)^2}{1.5Vt} = 4{,}17\ \Omega$.

6. A = I U_t = 0,6 A 2,5 V 1640 s = 2460 Vt s.

10-topshiriq

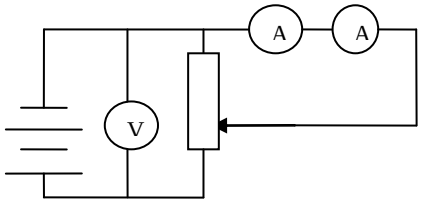


10 a rasm

1. Rasmdagi elektr zanjirining prinsipial sxemasini chizing.
2. Reostatning AB va BC qismlarining qarshiligi o'zaro qanday munosabatda o'rnatilgan?
3. Reostat surgichining qanday holatida № 2 voltmetrdagi kuchlanish nolga teng bo'ladi?
4. Mazkur zanjirdagi reostatni qanday parametrlarida ishlatish lozim? (Keltirilgan yechimidan tanlang.)
5. № 2 voltmetrning qarshiligini toping.

10-a rasmning yechimi

1.



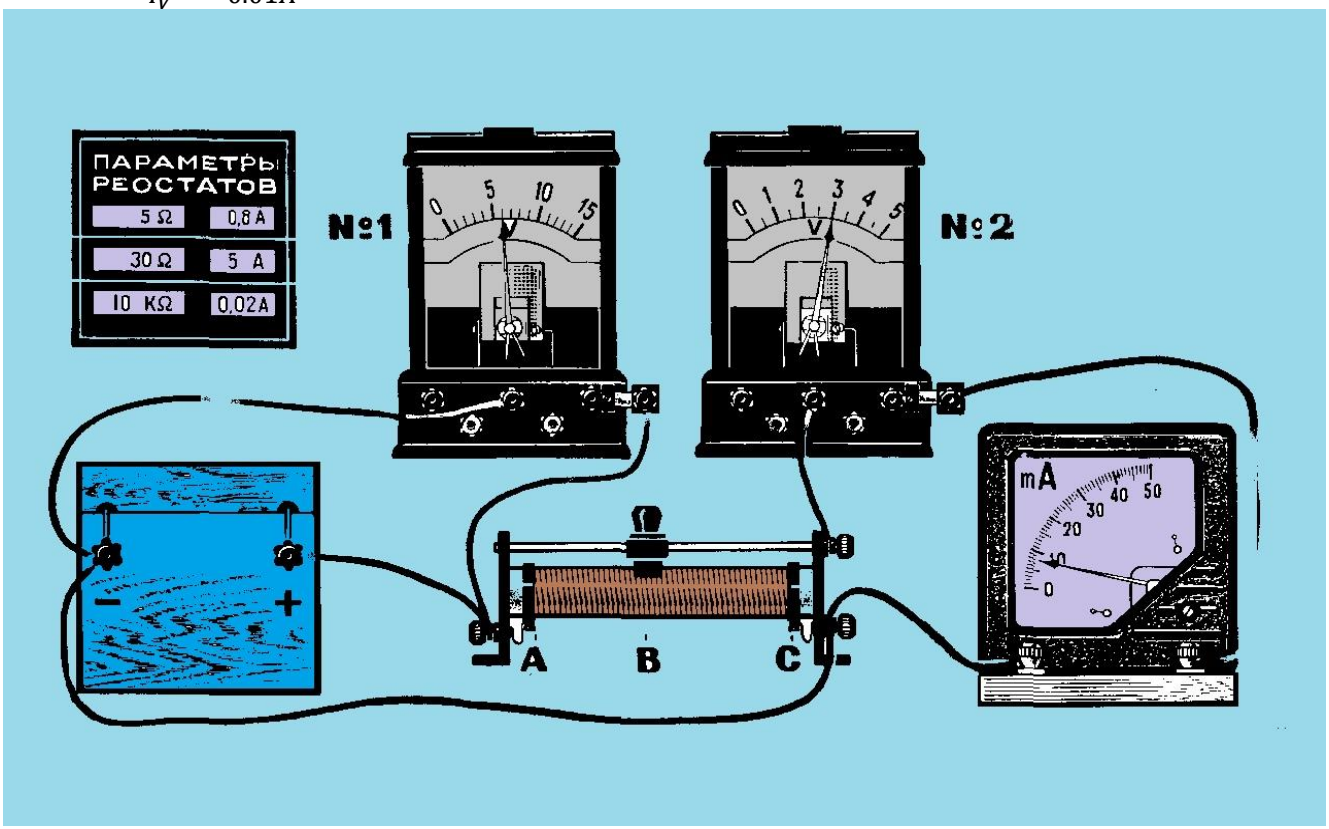
2. $U_{BC} = 15$ V. $U_{AB} = 100$ V - 15 B = 85 V.

$$\frac{AB}{BC} = \frac{U_{AB}}{U_{BC}} = \frac{85}{15} = \frac{17}{3}$$

3. Reostat surgichi C nuqtada turishi kerak.

4. Qarshiligi 30 va undan katta bo'lgan reostat. Chunki, tok manbai kuchlanishi 100 V bo'lganda 5 qarshilikli reostatda yo'l qo'yilishi mumkin bo'lgan tokda katta tok hosil bo'ladi.

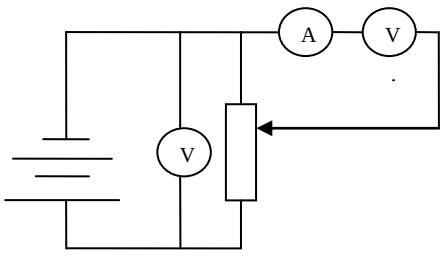
5. $R_v = \frac{U_V}{I_V} = \frac{15V}{0.01A} = 1500\ \Omega$.



10 b rasm

1. Yechimida tasvirlangan elektr zanjirning prinsipial sxemasini chizing.
2. Reostatning AB va BC qismlarining qarshiligi o'zaro qanday munosabatda o'rnatilgan?
3. Reostat surgichining qaysi holatida № 2 voltmetrdagi kuchlanish 1.5 V ga teng bo'ladi?
4. Berilgan zanjir uchun qanday parametrli reostat ishlatish mumkin? (Reostat parametrlarini Yechimidan tanlang).
5. № 2 voltmetr qarshiligini aniqlang.

10-b rasmning yechimi



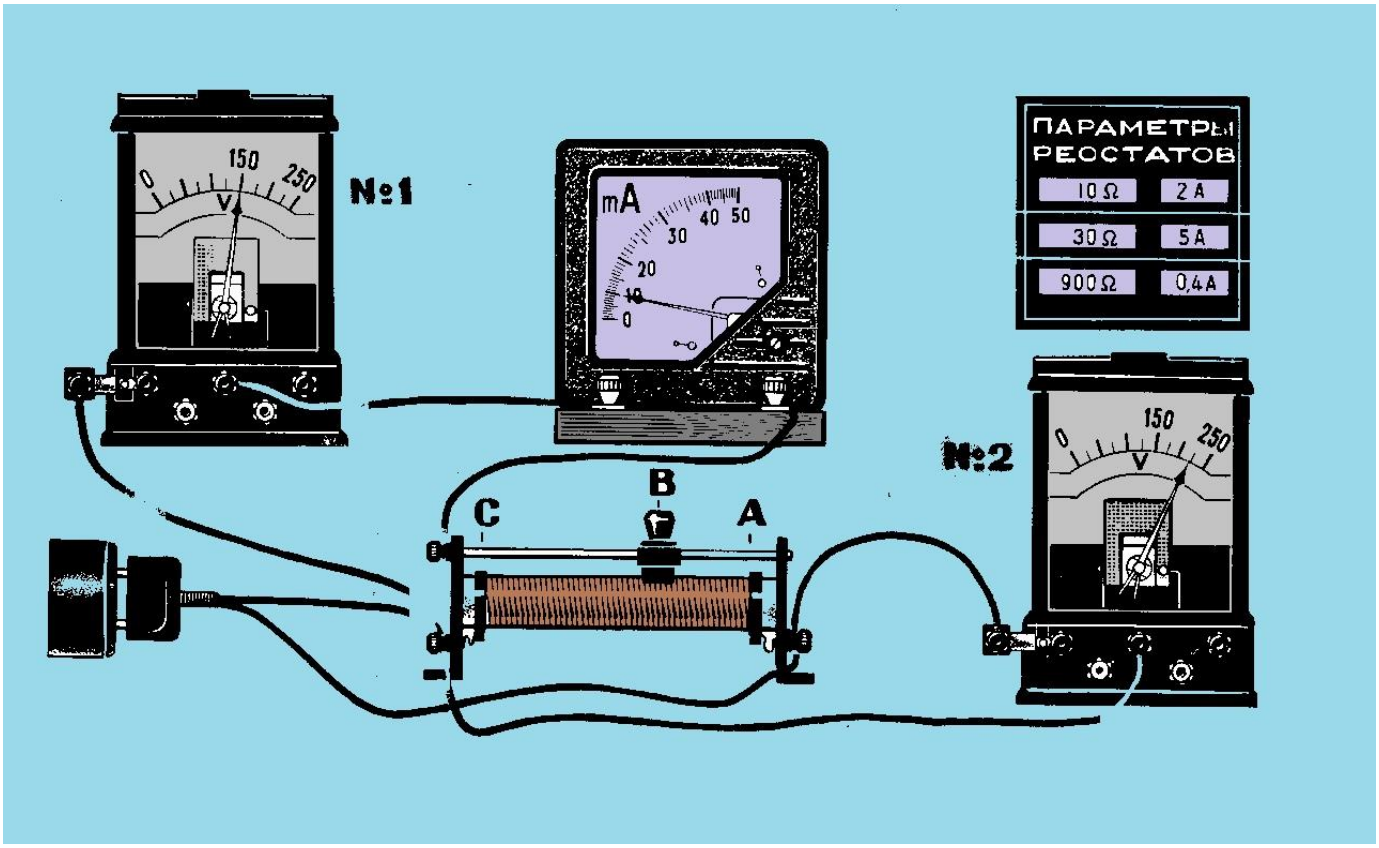
2. $U_{BC} = 3$ V. $U_{AB} = 6$ V - 3 V = 3 V.

$$\frac{AB}{BC} = \frac{U_{AB}}{U_{BC}} = \frac{3V}{3V} = 1.$$

3. Reostat surgichi AB kesmaning o'rta qismida turishi kerak.

4. 30 Ω yoki undan katta qarshilikli reostat, chunki, tok manbai kuchlanishi 6 V bo'lganda 5 Ω qarshilikli reostatdan 1,2 A tok o'tadi, bu esa ushbu reostatga qo'yilishi mumkuin bo'lgan tokdan kattadir.

5. $R_v = \frac{U_V}{I_V} = \frac{3V}{0.008A} = 375\ \Omega$.

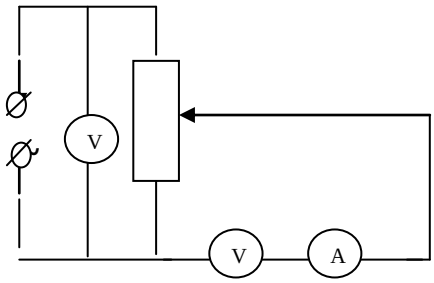


10 c rasm

1. Yechimida tasvirlangan elektr zanjirning prinsipial sxemasini chizing.
2. Reostatning AB va BC qismlarining qarshiligi o'zaro qanday munosabatda o'rnatilgan?
3. Reostat surgichining qanday holatida № 1 voltmetrning ko'rsatishi 110 V ga teng bo'ladi?
4. Berilgan zanjir uchun qanday parametrli reostat ishlatish mumkin? (Reostat parametrlarini Yechimidan tanlang).
5. № 1 voltmetr qarshiligini aniqlang.

10–c rasmning yechimi

1.

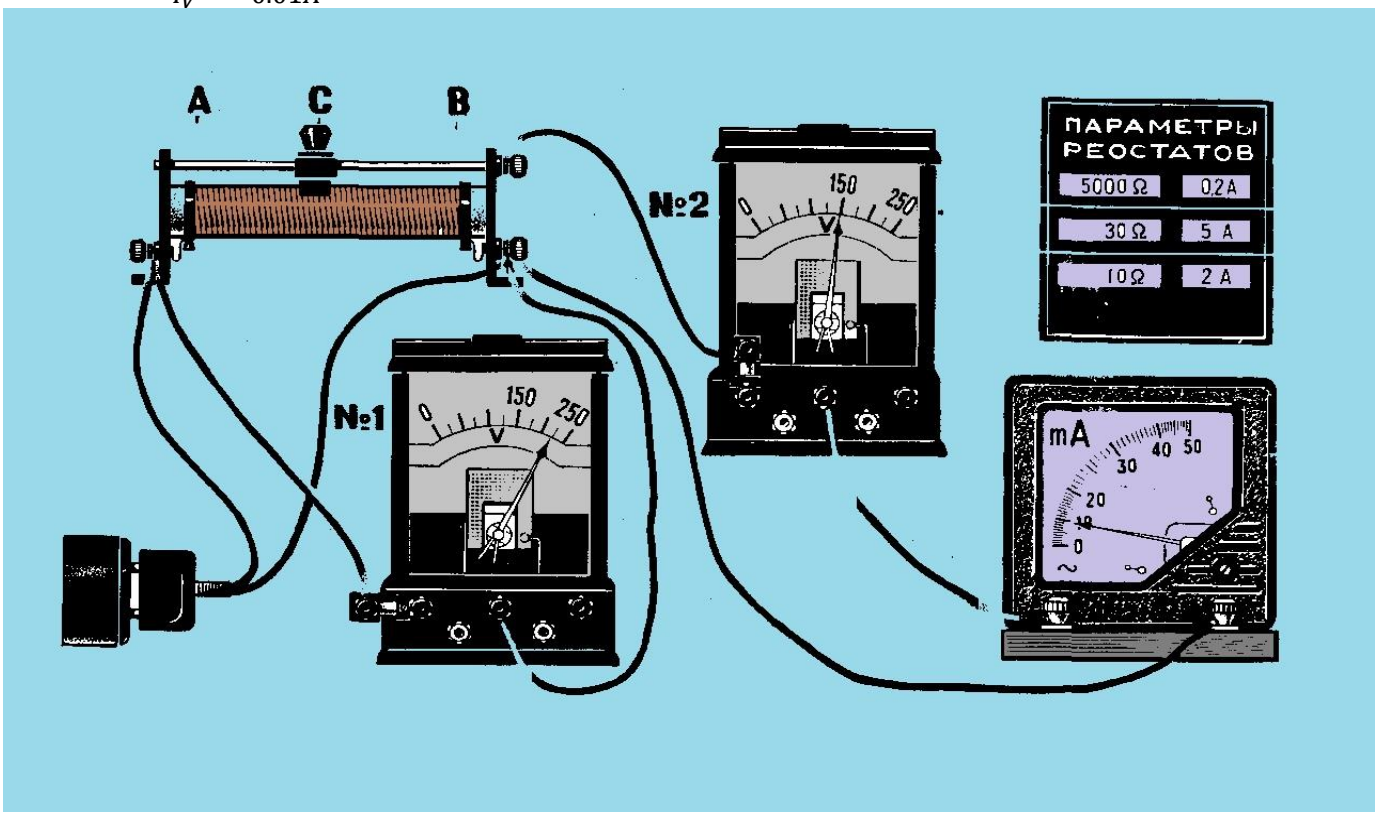


2. $U_{bc} = 150$ V. $U_{AC} = 220$ V. $\frac{AB}{BC} = \frac{U_{AB}}{U_{BC}} = \frac{220V}{150V} = \frac{22}{15}$

3. Reostat surgichi uning o'rtasida turishi kerak.

4. 900 Ω ga mo'ljallangan reostat ishlatish mumkun, chunki Yechimidagi boshqa reostatlar ulanganda ulardan yo'l qo'yi lishi mumkin bo'lganidan katta tok o'tadi.

5. $R_v = \frac{U_V}{I_V} = \frac{150V}{0.01A} = 15000$ Ω.

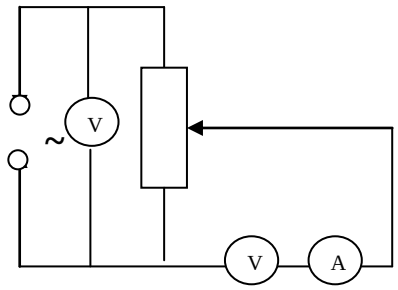


10 d rasm

1. Tablitsada tasvirlangan zanjirning prinsipial sxemasini chizing.
2. Reostatning AB va BC qismlarining qarshiligi o'zaro qanday munosabatda o'rnatilgan?
3. Reostat surgichining qanday holatida № 2 voltmetrdagi kuchlanish nolga teng bo'ladi?
4. Berilgan zanjir uchun qanday parametrli reostat ishlatish mumkin? (Yechimidan tanlang).
5. № 2 voltmetr qarshiligini aniqlang.

10-d rasmning yechimi

1.



2. U_{BC} = 150 V U_{AC} = 220 V - 150 V = 70 V

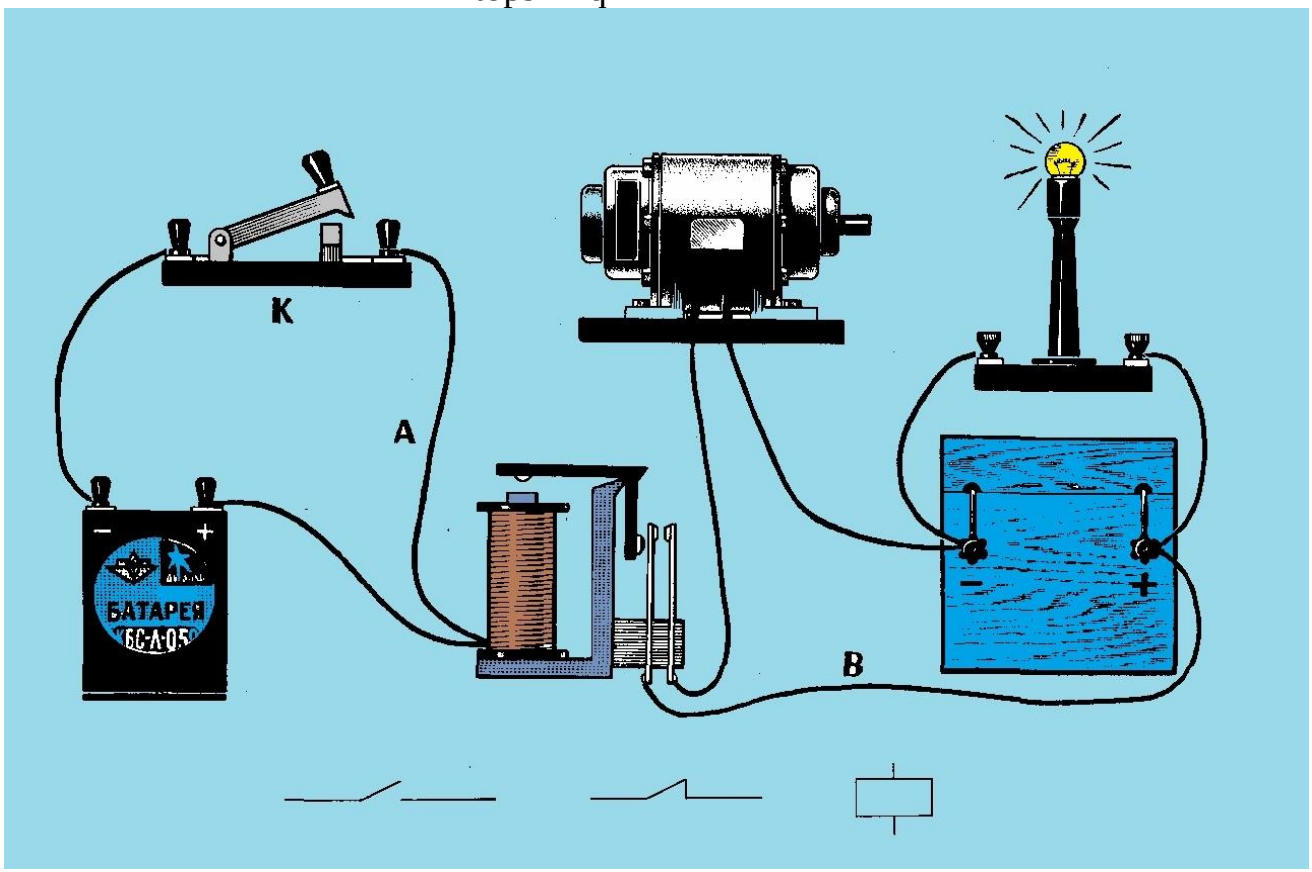
$\frac{AC}{CB} = \frac{U_{AC}}{U_{CB}} = \frac{70V}{150V} = \frac{7}{15}$;

3. Reostat surgichi B nuqtada turishi kerak.

4. 500 Ω qarshilikli reostat ishlatilishi mumkin, chunki Yechimidagi boshqa reostatlar ulanganda ulardan yo'l qo'yilishi mumkin bo'lganidan katta tok o'tadi.

5. $R_v = \frac{U_V}{I_V} = \frac{150V}{0.01A}$ = 15 000 Ω.

11-topshiriq



Shartli belgilar: Relening ulovchi Kontakti Relening ajratuvchi kontakti Rele chulg'ami

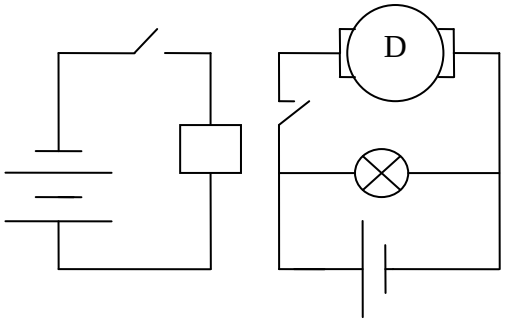
11 a rasm

1. Elektr zanjirining prinspial sxemasini Yechimidagi shartli belgilardan foydalanib chizing.

2. Agar kalit K ulansa nima sodir bo’ladi?
3. Kalit K ulangan xolda A o’tkazgichdagi tok kattami yoki B o’tkazgichdagimi?
4. Kalit K ulanganda Yechimida berilgan lampa o’chadigan xol uchun elekr sxemasini chizing.

11-a rasmning yechimi

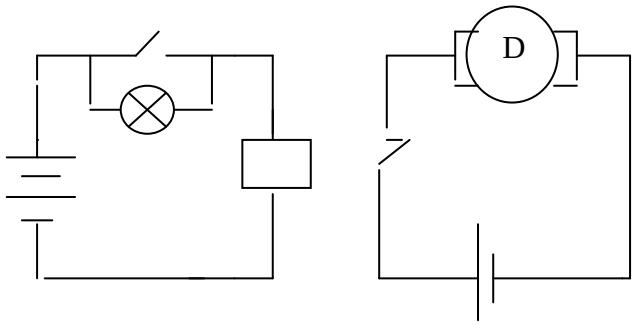
1.

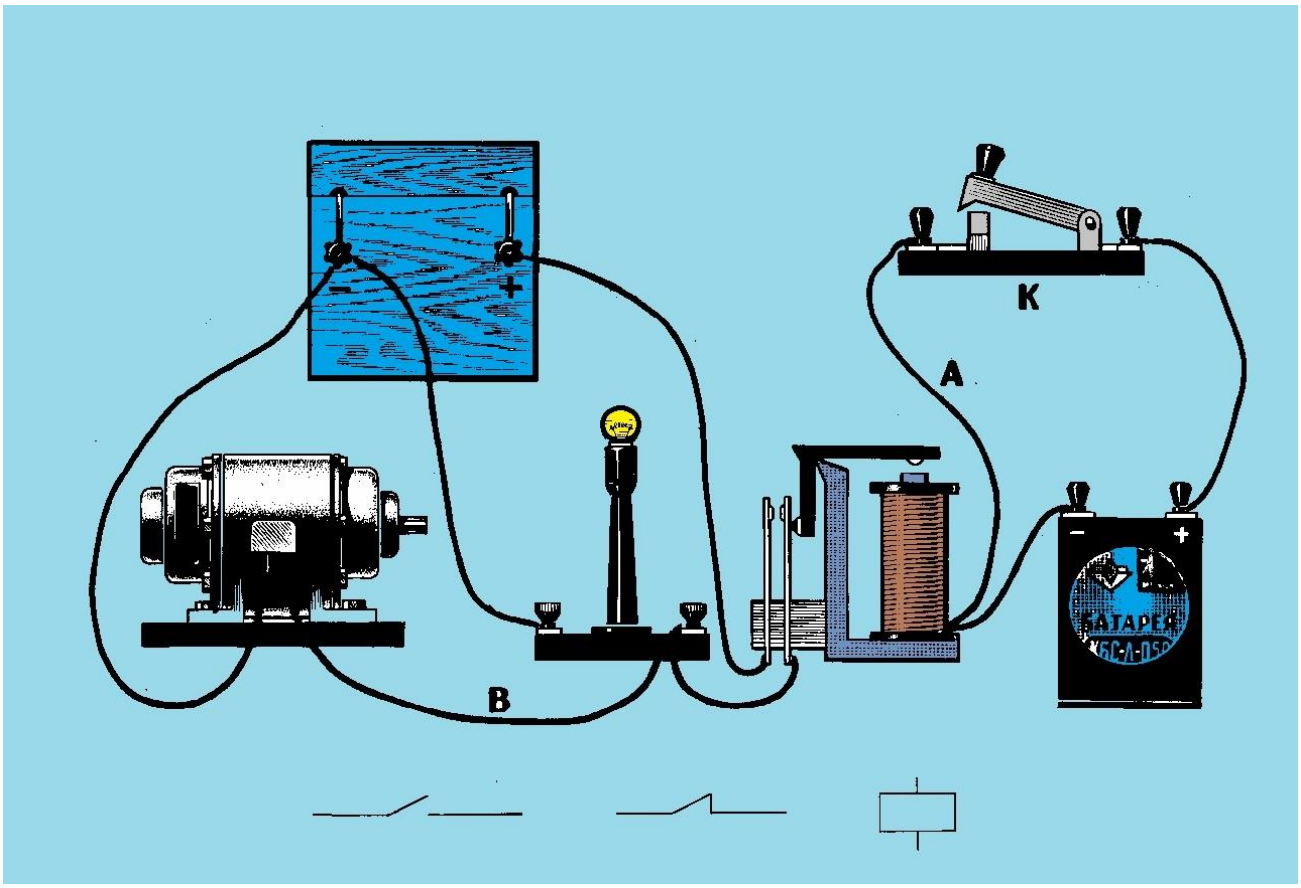


2. Kalit K ulanganda rele yakori o’zakka tortiladi va kontaktlar qo’shilib elektrodvigatel ulanadi. Lampa esa bevosita tok manbai qisqichlariga ulangan bo’lib, doimo yonib turadi.

3. A o’tkazgichdagi tok B o’tkazgichdagi tokdan kichik, chunki rele cho`lg’ami nisbatan katta qarshilikka ega bo’lib, kattaroq quvvatli zanjirlarni boshqarishga mo’ljallangan.

4. Lampa K kalit bilan parallel ulansa, u o’chib qoladi. (Lampa bilan rele cho`lg’ami qarshiligi o’zaro mutanosib holda sxema ishlaydi).





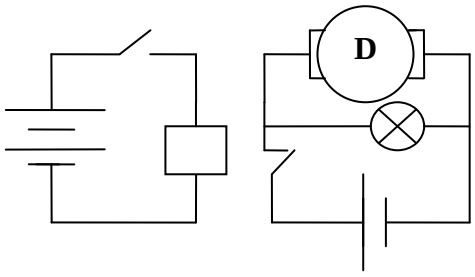
Shartli belgilar: Relening ulovchi Kontakti — Relening ajratuvchi kontakti — Rele chulg'ami

11 b rasm

1. Yechimida keltirilgan shartli belgilardan foydalanib elektr zanjiri sxemasini chizing.
2. Agar kalit K ulansa nima sodir bo'ladi?
3. Kalit ulangan xolda A o'tkazgichdagi tok kattami yoki B o'tkazgichdagimi?
4. Lampani kalit K ulanganda yonadigan qilib boshqaruv zanjiriga qayta ulang.

11-b rasmning yechimi

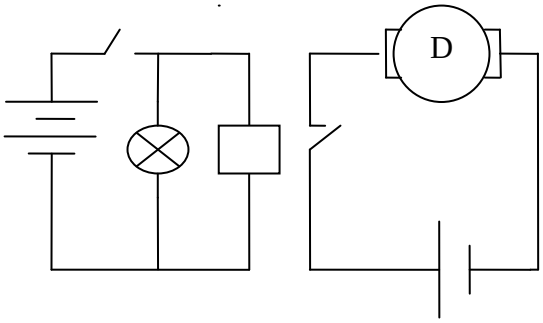
1.

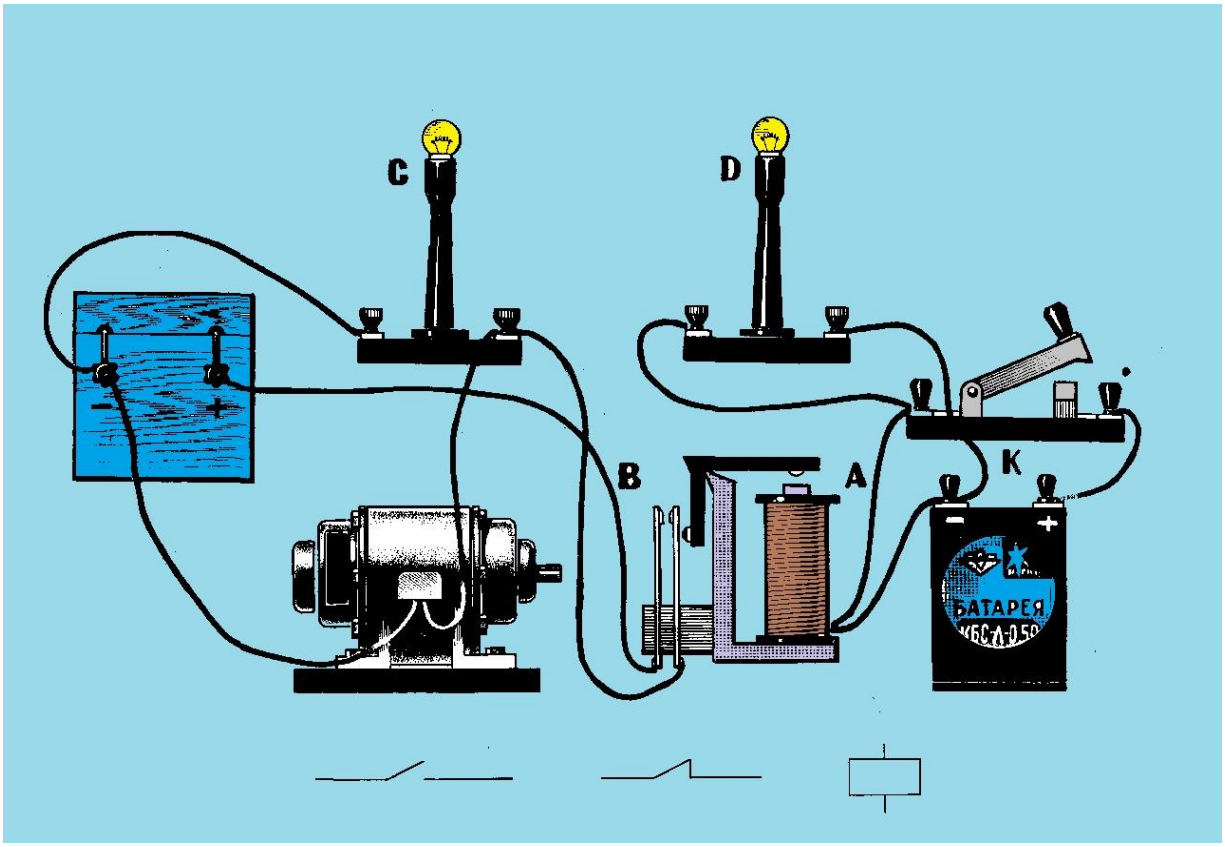


2. Kalit K ulanganda rele yakori tortiladi va uning kontaktlari qo'shiladi. Rele kontaktlari ulanganda elektrodvigatel va lampaning ulanishi sodir bo'ladi.

3. B o'tkazgichdagi tok A o'tkazgichdagidan katta bo'ladi, chunki elektrodvigatel quvvati rele quvvatidan katta.

4. Agar rele cho`lg'amiga lampani parallel ulab, K kalit ulansa, u yonadi. (Lampa bilan rele cho`lg'ami qarshiliklari o'zaro mutanosib holda sxema ishlaydi).





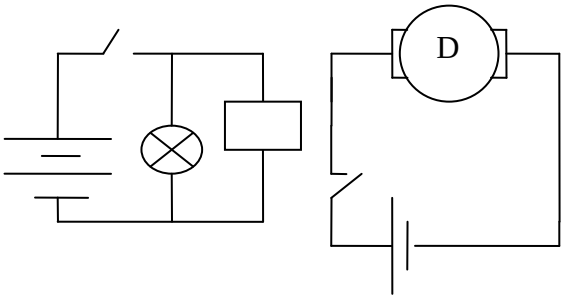
Shartli belgilar: Relening ulovchi Kontakti — Relening ajratuvchi kontakti — Rele chulg'ami

11 c rasm

1. Yechimida keltirilgan shartli belgilardan foydalanib elektr zanjiri sxemasini chizing.
2. Agar kalit K ulansa nima sodir bo'ladi?
3. Kalit ulangan xolda A o'tkazgichdagi tok katta bo'ladimi yoki B o'tkazgichdanmi?
4. Kalit ulanganda D lampa o'chib, C lampa yonadigan xol uchun elekr sxemasini chizing.

11-c rasmning yechimi

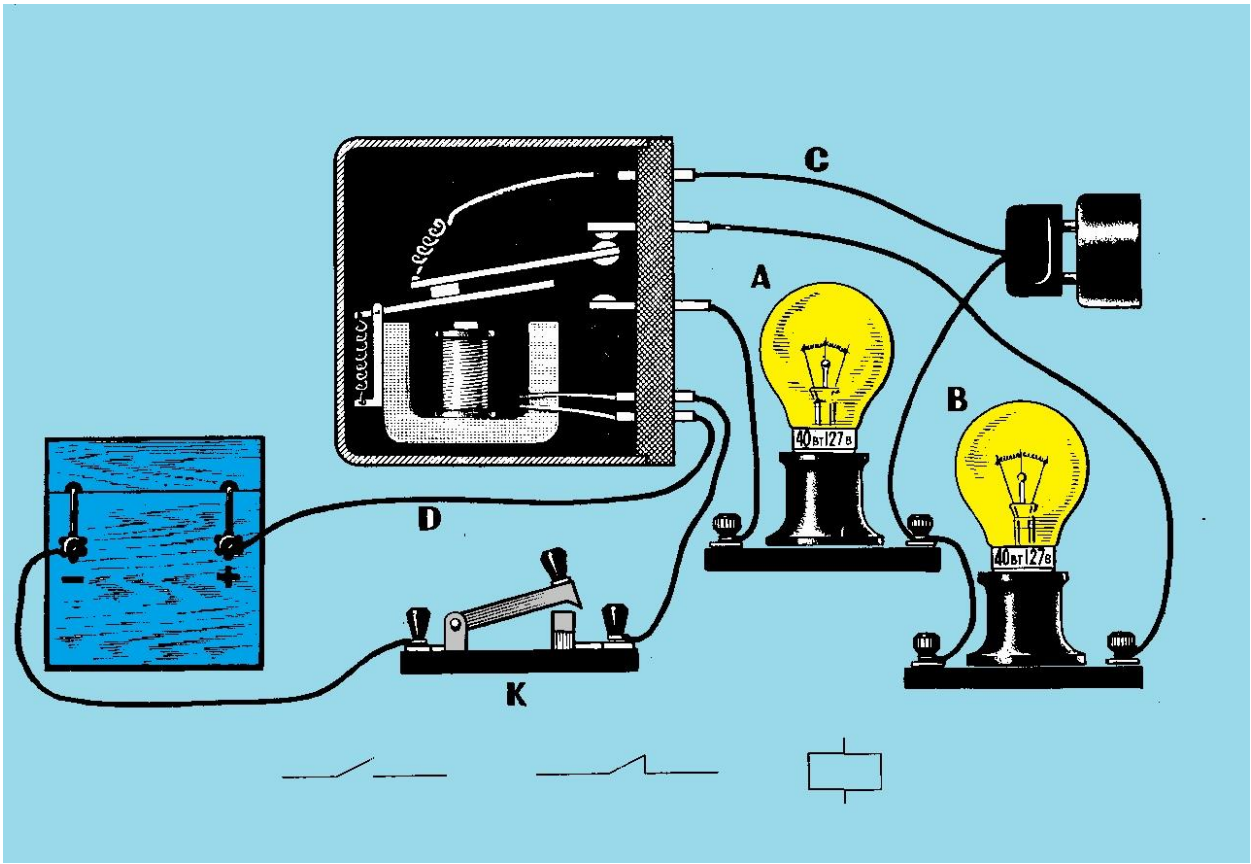
1.



2. Kalit K ulanganda rele cho`lg'ami va lampa D dan iborat zanjir ulanadi. Yakor tortiladi va elektrodvigatel hamda lampa C dan iborat zanjir kontakti ulanadi.

3. A o'tkazgichdagi tok kichik, chunki, amalda boshqaruv zanjirining quvvati ishchi zanjir (ya'ni bosh zanjir) quvvatidan kichik bo'ladi.

4. Lampa D ni kalit K bilan parallel ulash zarur. Lampa qarshiligi bilan rele hulg'ami qarshiligi o'zaro mos bo'lganda sxema ishlashi mumkin.



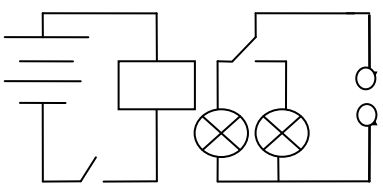
Shartli belgilar: Relening ulovchi Kontakti — Relening ajratuvchi kontakti — Rele chulg'ami

11 d rasm

1. Yechimida keltirilgan shartli belgilardan foydalanib elektr zanjiri sxemasini chizing.
2. Agar kalit K ulansa nima sodir bo'ladi?
3. Kalit ulanganda C o'tkazgichdan katta tok o'tadimi yoki D o'tkazgichdanmi?
4. Kalit K ulanganda B lampa yonib A lampa o'chadigan xol uchun elekr sxemasini qayta chizing.

11-d rasmning yechimi

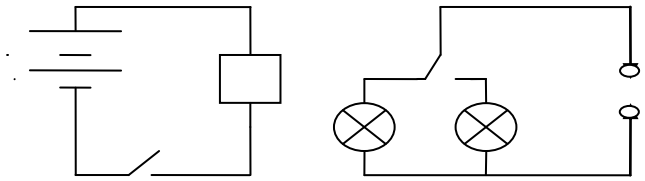
1.



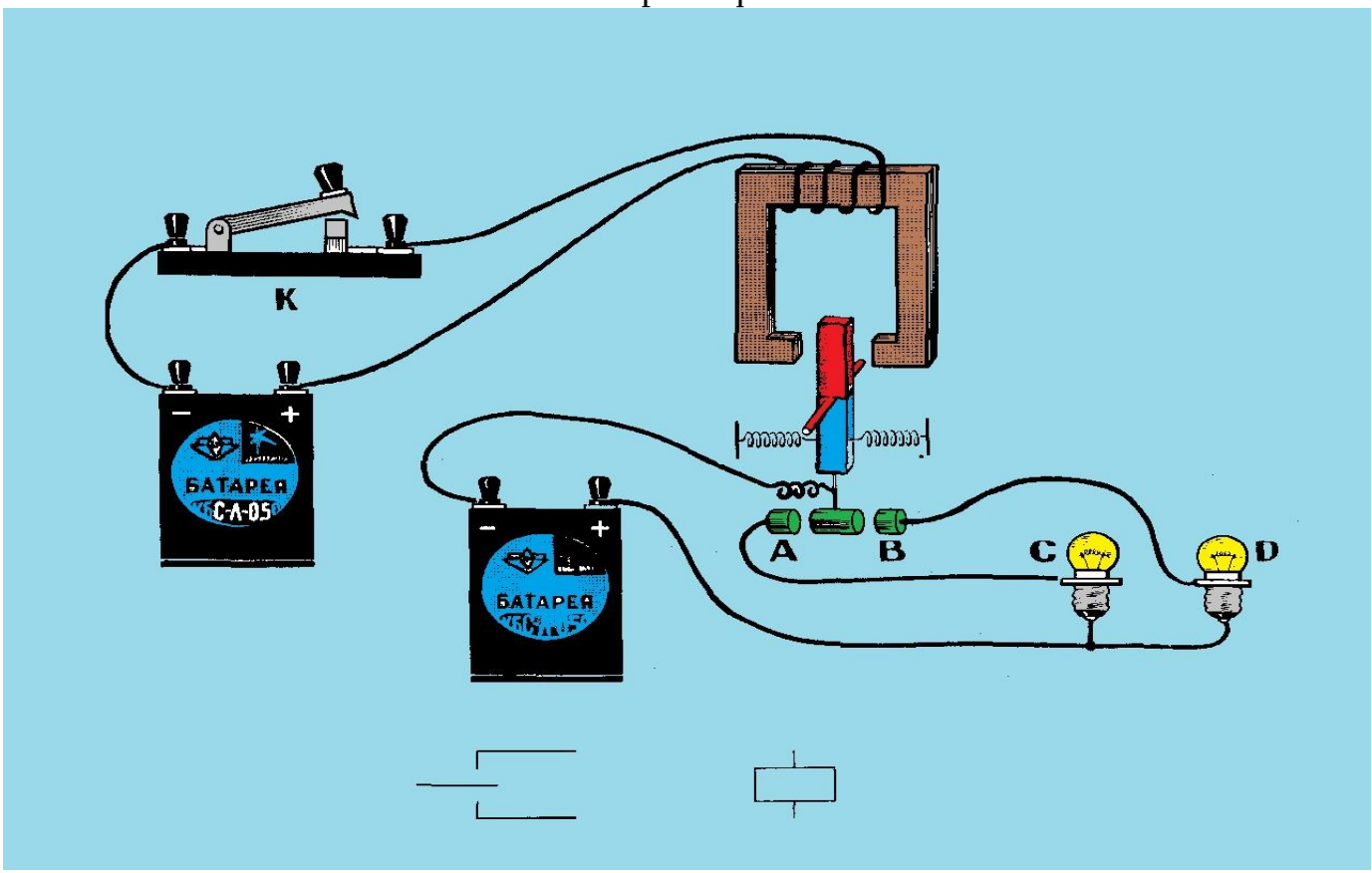
2. Kalit K ulanganda relening normal holatda ulangan kontaktlari ajralib ikkinchi kontaktlariga ulanadi. Natijada B lampa o'chib, A lampa yonadi.

3. B o'tkazgichdagi tok katta, chunki asosiy zanjirdagi quvvat boshqaruv zanjiridagi quvvatdan katta bo'ladi.

4. Relening qo'zg'almas kontaktlariga ulangan o'tkazgichlar o'rnini almashtirish zarur.



12-topshiriq



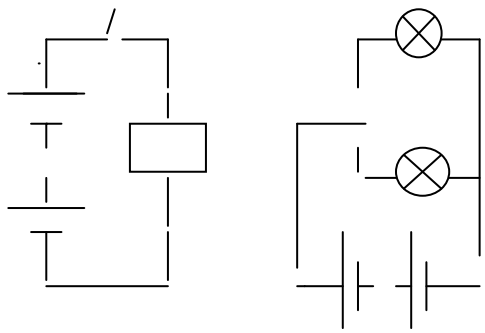
Shartli belgilar: -rele kontakti -rele chulg'ami

12 a rasm

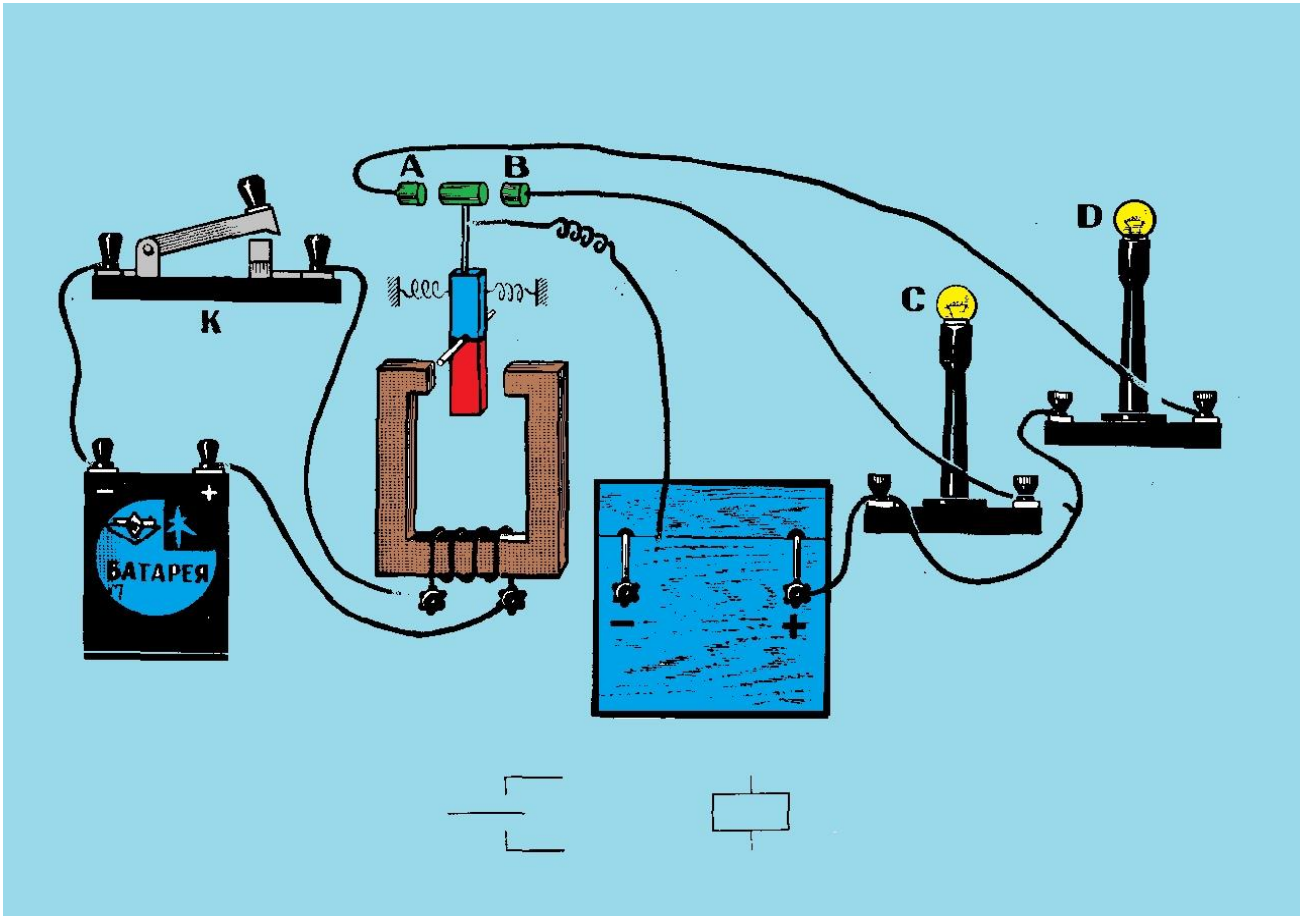
1. Elektr zanjirning prinspial sxemasini chizing.
2. Kalit K ulanganda sodir bo'ladigan xodisani tushuntiring.

12–a rasmning yechimi

1.



2. Kalit K ulanganda elektromagnit o'zagi magnitlanadi va uning uchlarida magnit qutblari hosil bo'ladi. O'qqa o'rnatilgan yakor doimiy magnit bo'lib, magnit qutblariga bog'liq ravishda o'ngga yoki chapga og'adi. Uning harakatlanuvchi kontakti harakatlanmaydigan A yoki B kontaktlarga ulanadi. Bu esa u yoki bu lampa ning yonishiga olib keladi. Sxemada tasvirlanishi bo'yicha C lampa yonadi.



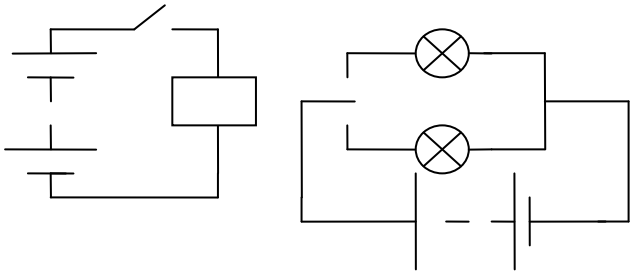
Shartli belgilar: -rele kontakti -rele chulg'ami

12 b rasm

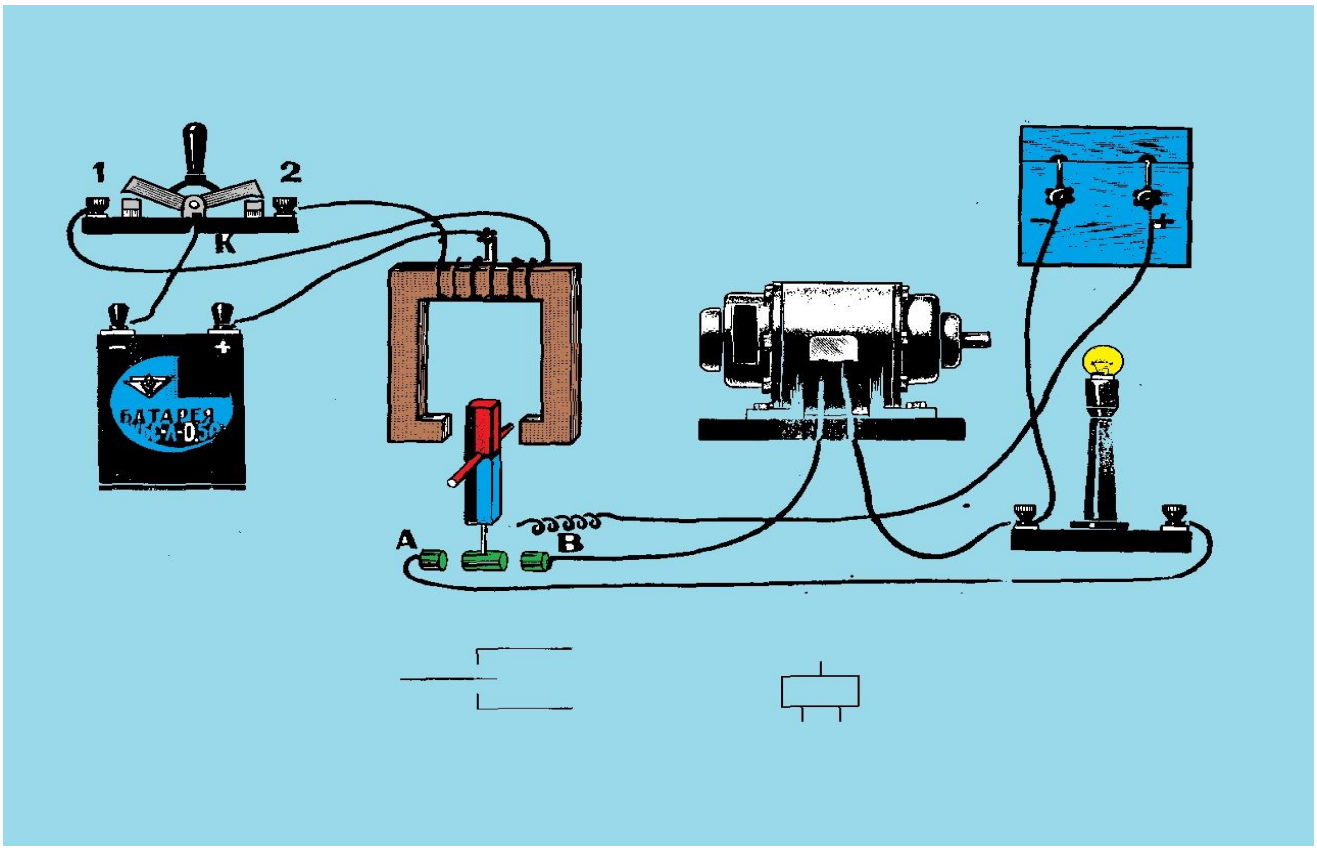
1. Elektr zanjirning prinspial sxemasini chizing.
2. Kalit K ulanganda sodir bo'ladigan xodisani tushuntiring.

12-b rasmning yechimi

1.



3. Xodisa 12-a Yechimining 2 - punktida tushuntirilgan.



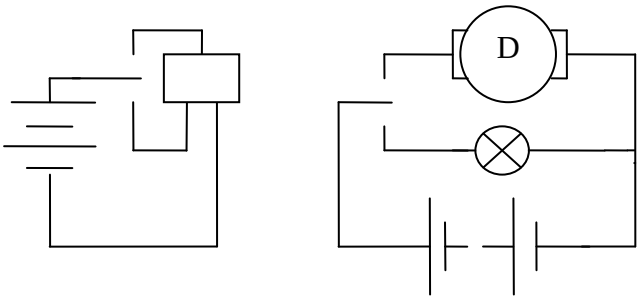
Shartli belgilar: -rele kontakti -rele chulg’ami

12 c rasm

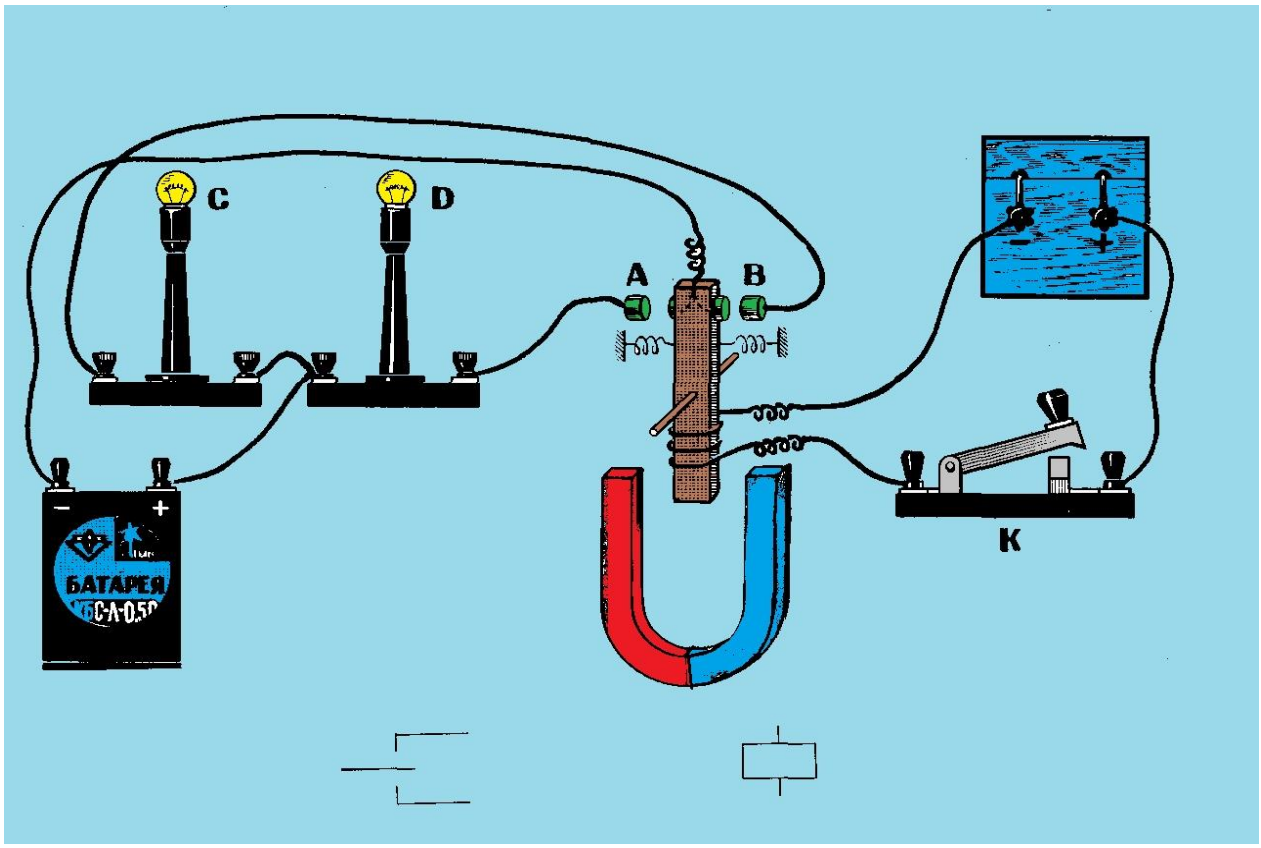
1. Elektr zanjirning prinspial sxemasini chizing.
2. Kalit K ning avval kontakt l ga, keyin kontakt 2 ga ulangan holda qanday hodisa ro’y berishini tushuntiring.

12–c rasmning yechimi

1.



2. Kalit kontakt 1 ga ulanganda elektromagnit yakori shunday joylashadiki, harakatlanuvchi kontakt tinch turuvchi B kontakt bilan qo’shiladi va elektrodvigatel ulanadi. Kalit kontakt 2 ga ulanganda esa harakatlanuvchi kontakt tinch turuvchi A kontakt bilan ulanadi va lampa yonadi.



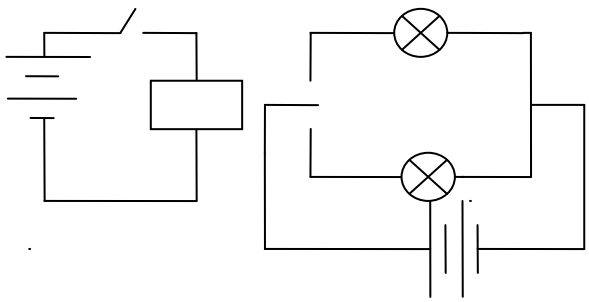
Shartli belgilar: -rele kontakti -rele chulg’ami

12 d rasm

1. Elektr zanjirning prinspial sxemasini chizing.
2. Kalit K ulanganda qanday hodisa sodir bo’ladi? (Magnit qutblari orasida joylashgan o’zak po’latdan yasalgan va neytral xolatda ikkita spiral prujina bilan ushlab turiladi).

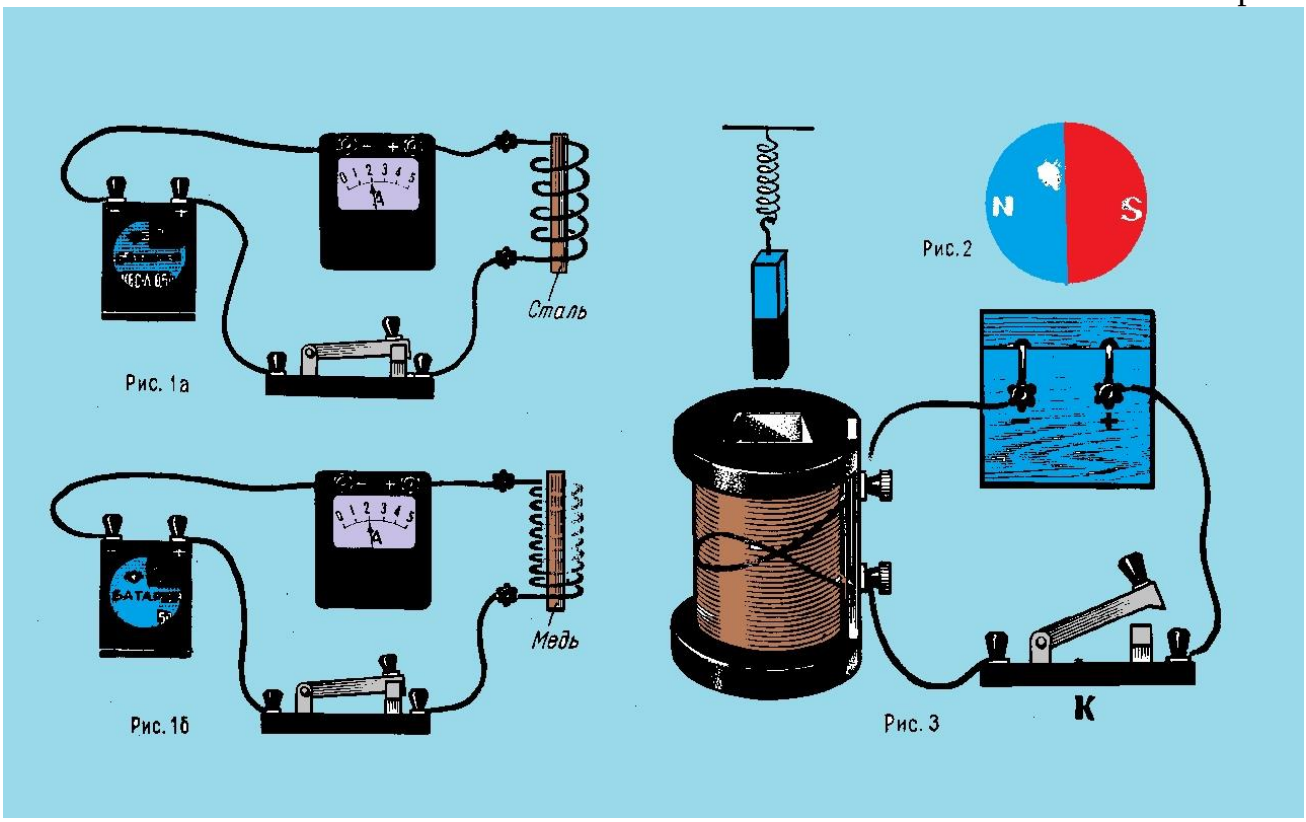
12-d rasmning yechimi

1.



2. Kalit K ulanganda rele yakori cho`lg’ami zanjirida tok hosil bo’lib, yakor shunday magnitlanadiki, bunda yakorning pastki qismida magnitning shimoliy qutbi hosil bo’ladi.

Qutblarning o’zaro ta’siri natijasida yakor o’ng tamonga aylanadi, harakatlanuvchi kontakt B kontakt bilan qo’shiladi va lampa C yonadi.



13 a rasm

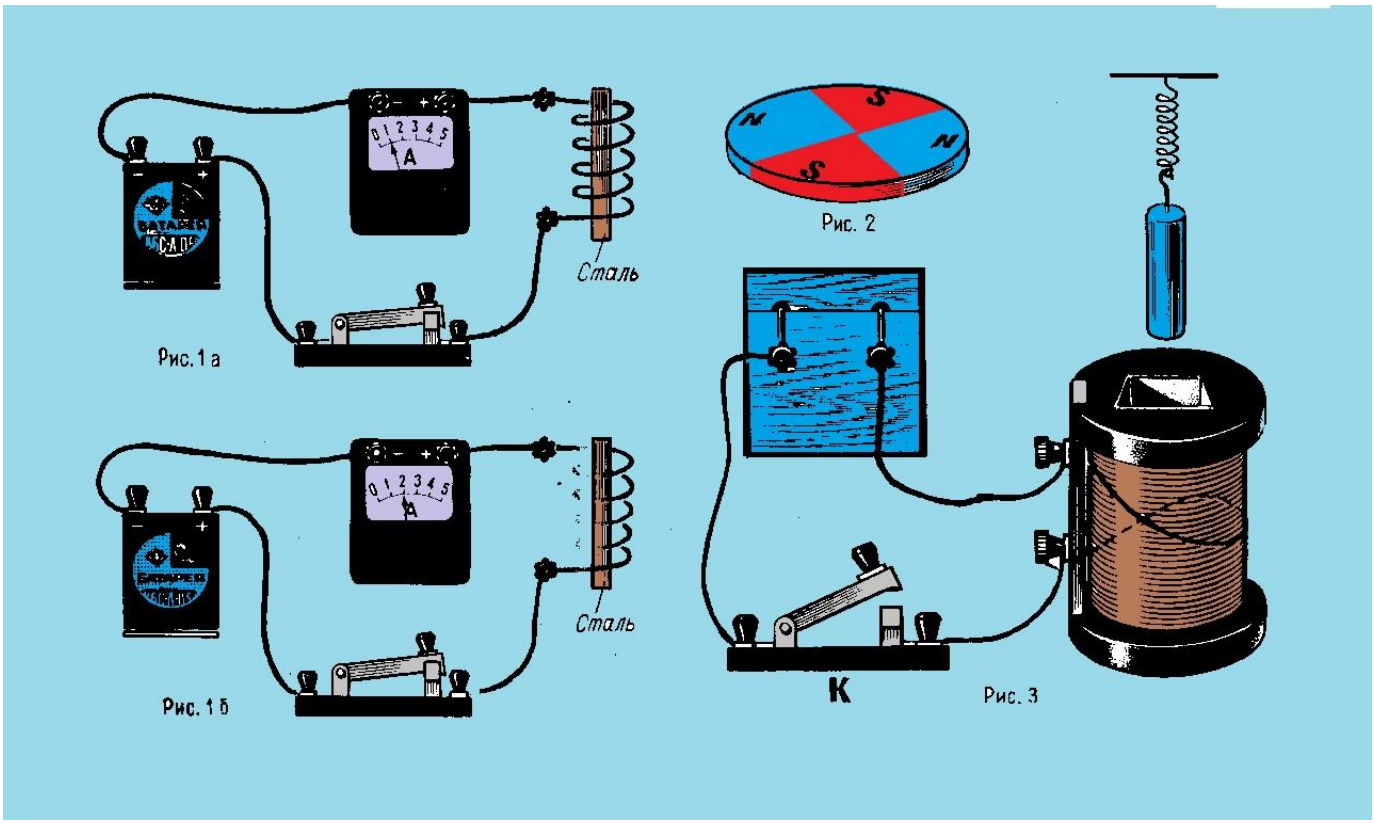
1. 2-rasmdagi po’lat sharni biror usulda S, N qutubli qilib magnitlash mumkinmi? Agar mumkin bo’lsa magnit spektrini chizing.
2. Yechimining 1a va 1b rasmlarida alohida zanjirga ulangan ikkita elektromagnit tasvirlangan. Ushbu elektromagnitlardan qaysi biri kattaroq ko’tarish kuchiga ega. Javobingizni asoslang.
3. Kalit K ulanganda qanday xodisa yuz beradi?

13-a rasmning yechimi

1. Sharni tokli g’altak yordamida yoki magnit qutblari orasiga joylashtirib magnitlash mumkin.

2. 1-a rasmda tasvirlangan elektromagnit o’ramlari soni kam bo’lsa ham ko’proq ko’tarish kuchiga ega. Buni quyidagicha tushuntiriladi: o’ramlar sonini ikki marta oshi rishga nisbatan po’lat o’zak kiritilganda magnit maydoni ko’proq kuchayadi.

3. G’altakdan magnit qochadi.



13 b rasm

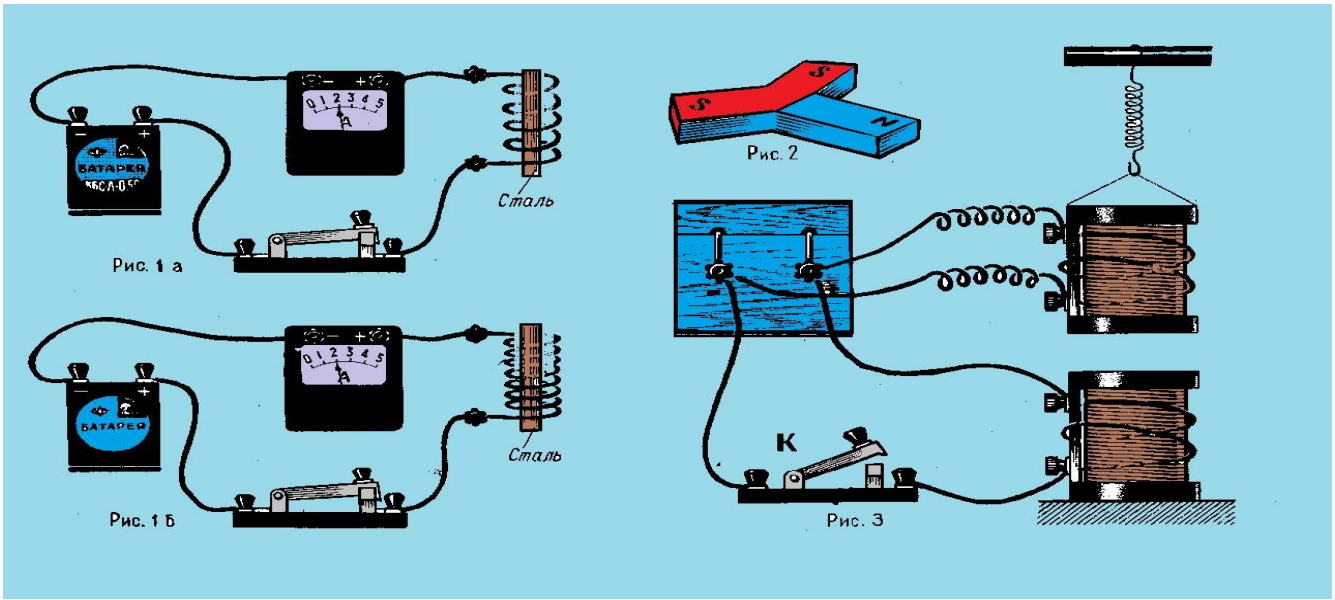
1. Po’lat plastinkani 4 qutubli qilib magnitlash mumkinmi? Agar mumkin bo’lsa qanday qilib? Magnit spektrini chizing.
2. Yechimining 1a va 1b rasmlarida alohida zanjirga ulangan ikkita elektromagnit tasvirlangan. Ushbu elektromagnitlardan qaysi biri kattaroq ko’tarish kuchiga ega. Javobingizni asoslang.
3. Kalit K ulanganda 3-rasmdagi po’lat o’zak va g’altak qanday tasirlashadi?

13-b rasmning yechimi

1. Plastinkani taqasimon magnitga tekizish orqali magnitlash mumkin.

2. 1-b rasmda tasvirlangan magnit katta ko’tarish kuchiga ega bo’ladi, chunki bir xil sharoitda undan kattaroq tok o’tadi.

3. Po’lat o’zak g’altakka tortiladi.



13 c rasm

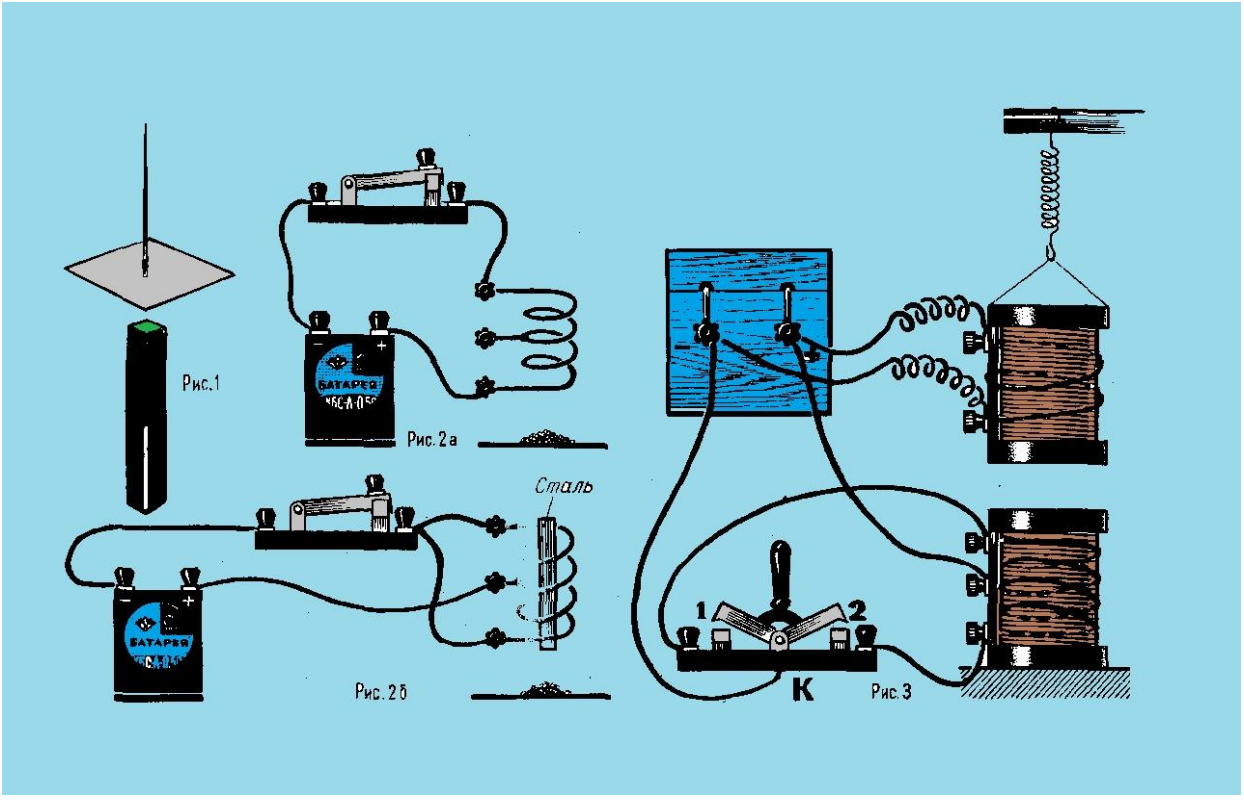
1. 2-rasmdagi po’lat plastinkani uch qutubli qilib magnitlash mumkinmi?. Agar mumkin bo’lsa magnet spektrini chizing.
2. Yechimining 1a va 1b rasmlarida alohida zanjirga ulangan ikkita elektromagnit tasvirlangan. Ushbu elekrtomagnitlardan qaysi biri kattaroq ko’tarish kuchiga ega? Javobingizni asoslang.
3. 3-rasmdagi kalit K ulanganda ikkita g’altak o’zaro qanday tasirlashadi? G’altaklardan bittasi prujinaga osilgan.

13–c rasmning yechimi

1. Po’lat plastinkani taqasimon magnitga tekkizish orqali yoki uning bir tamonini tokli g’altakka joylashtirish orqali magnitlash mumkin.

2. 1- b rasmda tasvirlangan elektromagnitni ko’tarish kuchi, chunki bir xil sharoitda uning cho`lg’ami ko’proq o’ramlar soniga ega.

3. G’altaklar tortishadi.



13 d rasm

1. Ninani 1-rasmda ko’rsatilganday qog’oz varag’i ustiga tik holda qo’yish mumkinmi?
2. Yechimini 2a va 2b rasmlarida tokka ulangan ikkita g’altak tasvirlangan. G’altakning bittasiga p’lat o’zak kiritilgan. G’altaklardan qaysi biri katta magnit xususiyatiga ega bo’ladi?
3. Ikkita g’altak 3-rasmda ko’rsatilgandek qilib joylashtirilgan bo’lib, ularning bittasi prujinaga mahkamlangan. K kalit 1-kontakdan ajratilib, ikkinchi kontaktga ulanganda g’altaklar o’zaro qanday tasirlashadi?

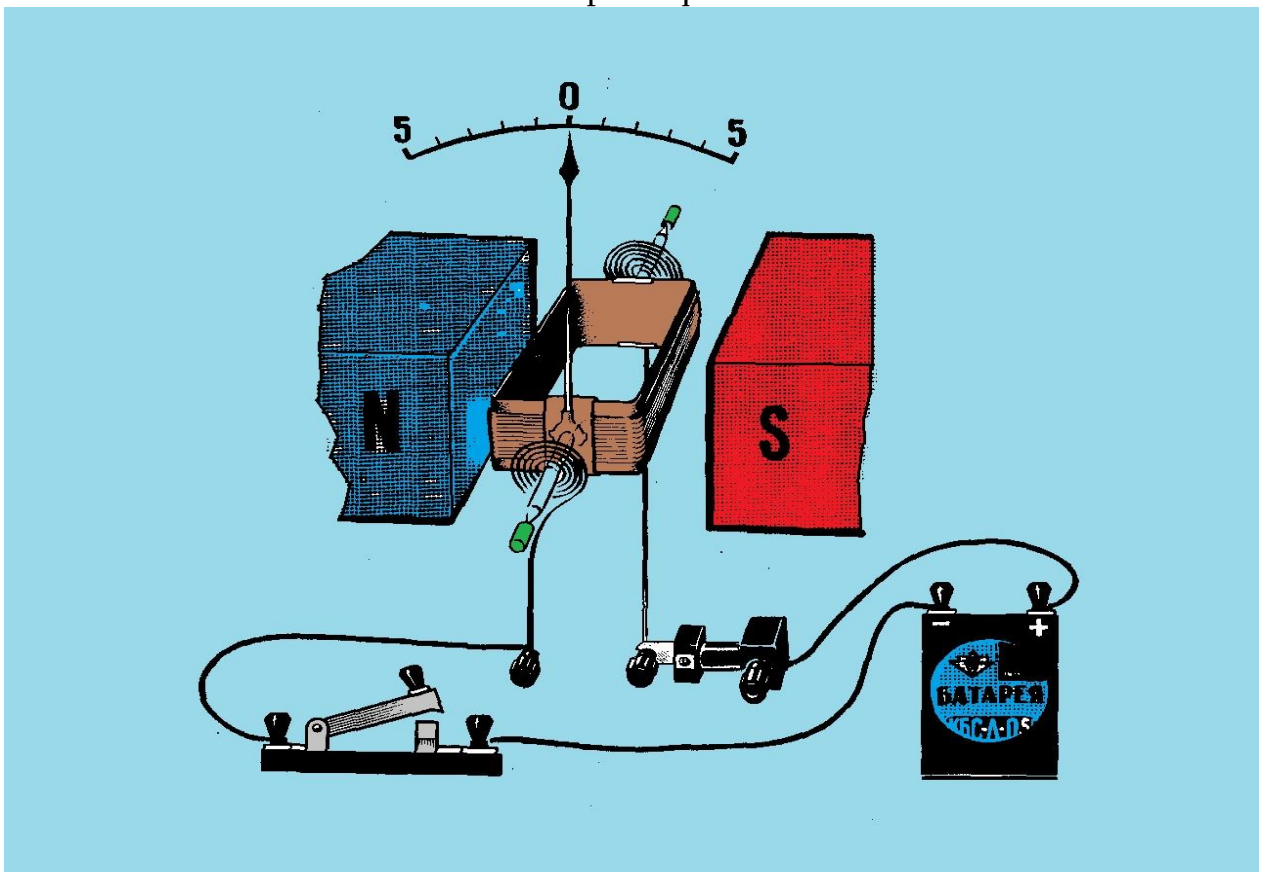
13-d rasmning yechimi

1. Agar magnit maydoni yetarli darajada katta bo’lsa, ignani vertikal holatda qo’yish mumkin.

2. 2-a rasmda tasvirlangan g'altakning magnit xususiyati kattaroq bo'ladi, chunki 2-b rasmda tasvirlangan g'altak seksiyalaridagi toklar qarama – qarshi yo'nalgan.

3. Kalit kontakt 1 ga ulanganda g'altaklar o'zaro itarishadi, kontakt 2 ga ulanganda esa o'zaro tortishadi.

14-topshiriq



14 a rasm

1. Rasmda tasvirlangan asbob qurulmasida qanday hodisadan foydalaniladi?
2. Kalit ulanganda strelkaning og'ish yo'nalishini aniqlang.
3. Qo'shimcha qarshilikning vazifasi nimadan iborat?
4. Mazkur asbob nimani o'lchaydi?
5. Asbob prujinasini qattiqroq prujina bilan almashtirilsa, ko'rsatishi o'zgaradimi?
6. Asbobdagi prujinaning vazifasi nimadan iborat?
7. Agar qo'shimcha qarshilik qiymati oshirilsa, strelkaning og'ish burchagi qanday o'zgaradi

14-a rasmning yechimi

1. Asbob qurilmasida tok va magnit maydonining o'zaro ta'sir hodisasi qo'llaniladi.

2. Strelka chapga og'adi.

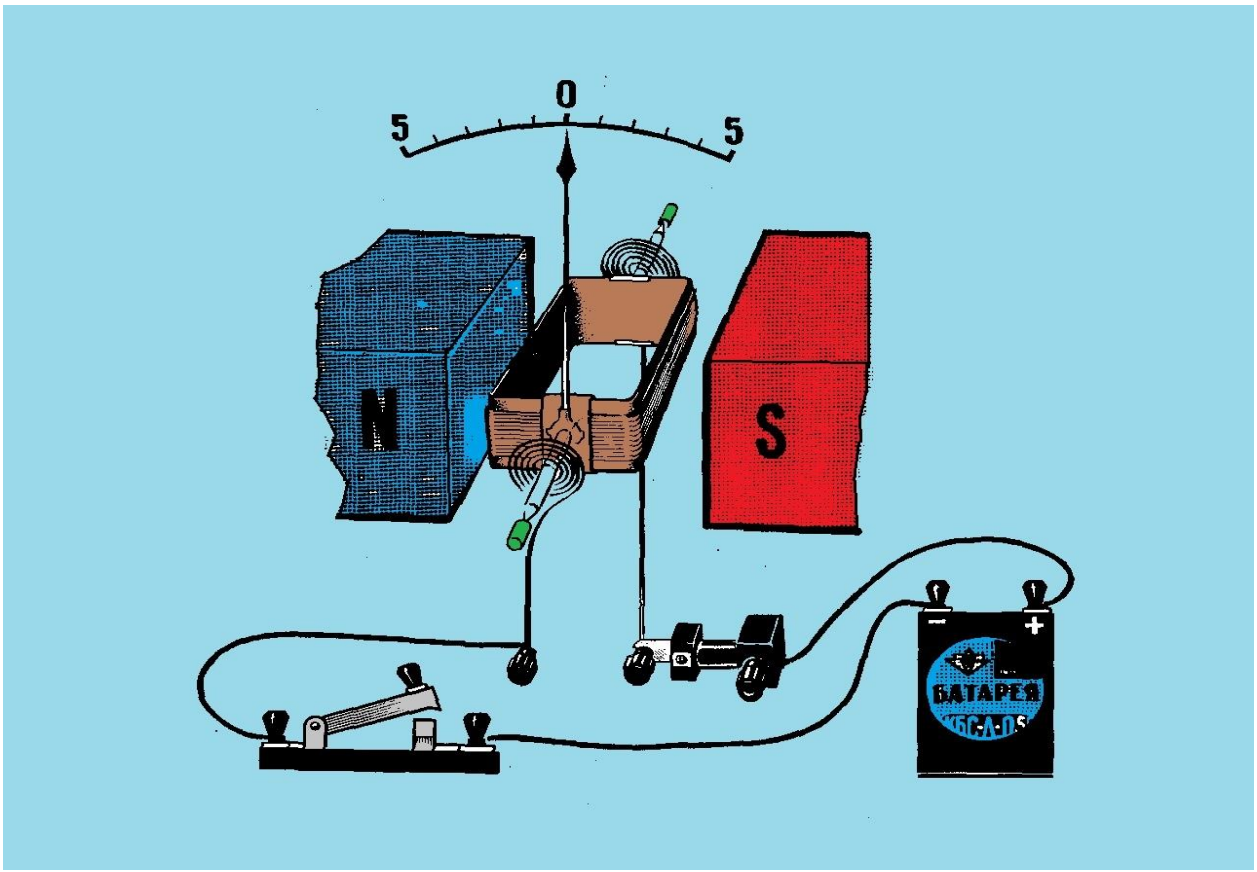
3 Qo'shimcha qarshilik ramka chulg'amidagi tokni kamaytiradi.

4. Asbob kuchlanishni o'lchaydi.

5. Prujina bikrligi oshishi bilan strelkaning og'ish burchagi kamayadi.

6. Prujinalar ramkani tashqi zanjir bilan ulashga hamda ramkadan tok o'tganda uning aylanishiga qarshi ta'sir qilish uchun mo'ljallangan.

7. Qo'shimcha qarshilik kamayishi bilan strelkaning og'ish burchagi oshadi.



14 c rasm

1. Yechimida tasvirlangan asbob qurilmasida qanday hodisadan foydalaniladi?
2. Kalit ulanganda strelkaning og'ish yo'nalishini aniqlang.
3. Asbob qo'shimcha qarshiliksiz ishlay oladimi?
4. Mazkur asbob nimani o'lchaydi?
5. Prujinalarni noelastik o'tkazgich bilan almashtirish mumkinmi?
6. Agarda prujinani katta elastiklikga ega bo'lgan prujina bilan almashtirilsa asbobning ko'rsatishi qanday o'zgaradi?
7. Agar qo'shimcha qarshilik qiymati oshirilsa, strelkaning og'ish burchagi qanday o'zgaradi?

14-c rasmning yechimi

1. Asbob qurilmasida tok va magnit maydonining o'zaro ta'siri hodisasi qo'llaniladi.

2. Strelka chapga og'adi.

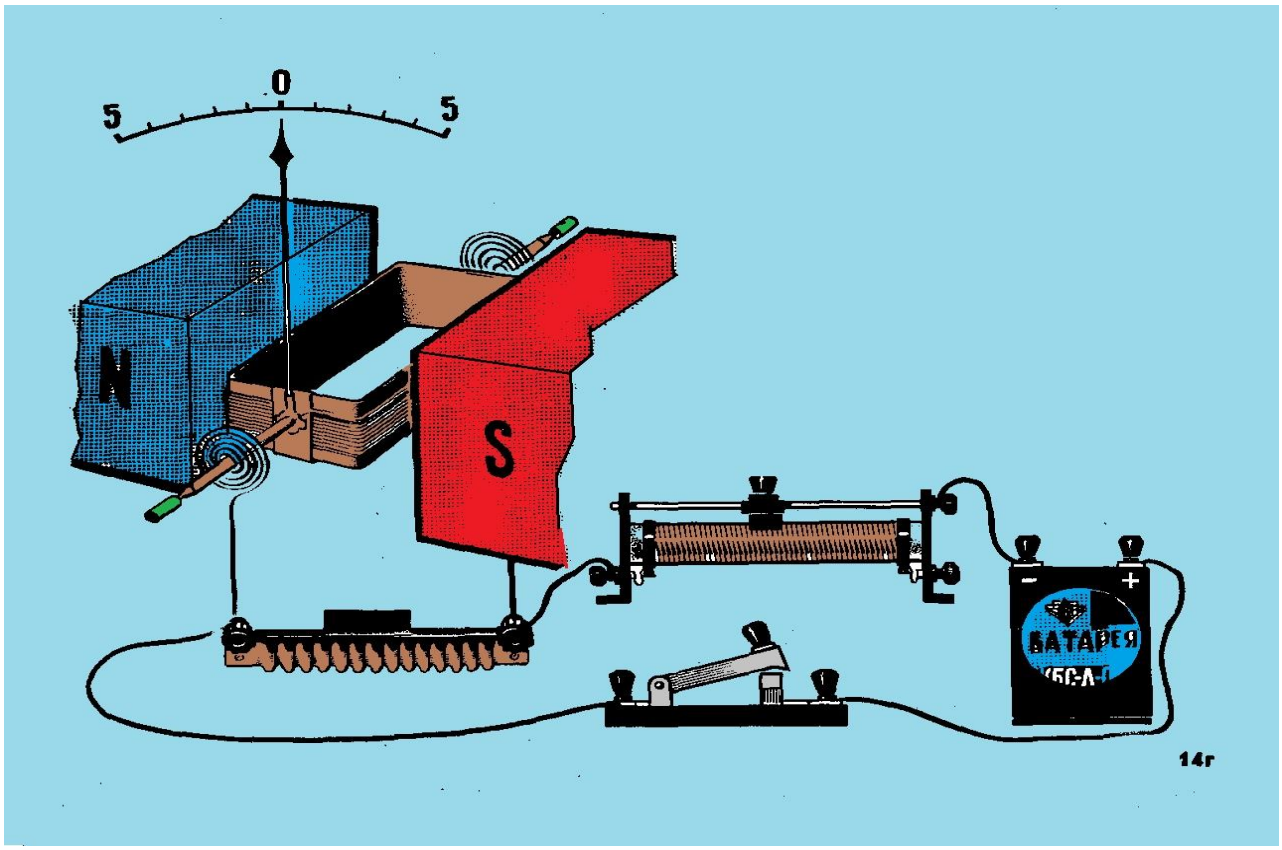
3. Mumkin, ammo bunda juda kichik kuchlanishni o'lchay oladi, aks holda ramka chulg'amidagi tok katta bo'lib u kuyadi.

4. Ushbu asbobda kuchlanish o'lchanadi.

5. Mumkin emas, u holda ramkadagi tokning hohlagan qiymatida asbob strelkasi shkalaning oxirigacha og'adi.

6. Strelkaning og'ishi burchagi kamayadi.

7. Sterlkaning og'ishi burchagi kamayadi.



14 d rasm

1. Tasvirdagi asbob ishlashida qanday hodisadan foydalaniladi?
2. Kalit ulanganda strelkaning og'ish yo'nalishini aniqlang.
3. Shunt vazifasi nimadan iborat?
4. Tasvirlangan asbob nimani o'lchaydi?
5. Prujinalardan bittasini elastik o'tkazgich bilan almashtirish mumkinmi?
6. Agar shunt qarshiligi kamaytrilsa, asbob ko'ratishi qanday o'zgaradi?
7. Agar prujinalar elastikligi katta prujina bilan almashtirilsa, ampermetr ko'rsatishi qanday o'zgaradi?

14-d rasmning yechimi

1. Asbob qurilmasida tok va magnit maydonining o'zaro ta'sir hodisasi qo'llaniladi.

2. Strelka o'ngga og'adi.

3. Shunt ramkadagi tok qiymatini cheklaydi..

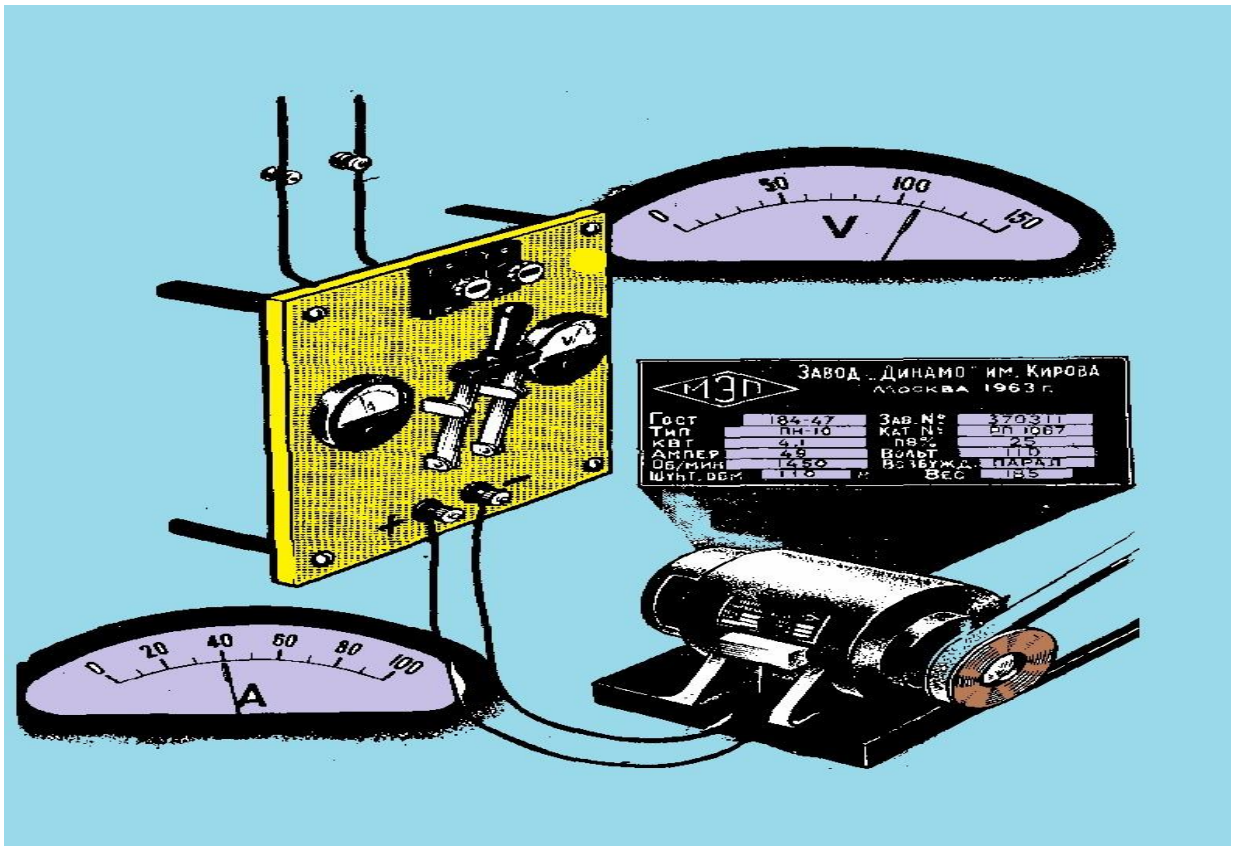
4. Mazkur asbob tok kuchini o'lchaydi.

5. Mumkin, chunki aks ta'sir ikkinchi prujinada hosil qilinadi.

6. Shunt qarshiligi kamayganda strelkaning og'ish burchagi kamayadi.

7. Strelkaning og'ish burchagi kamayadi.

15-topshiriq

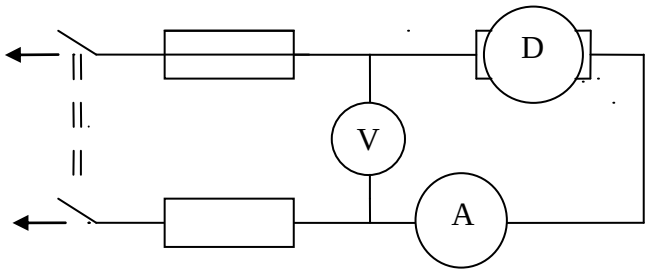


15 a rasm

1. Elektr zanjirining prinspial sxemasini chizing.
2. Elektrodvigatelning quvvatini toping.
3. Agar elektrodvigatel valiga bo'lgan qarshilik quvati 2.5 kVt bo'lsa, elektrodvigatelning FIK ini toping?
4. Elektr shitdagi tokli o'tkazgichlar o'rnini almashtirilsa , elektrodvigatelning aylanish yo'nalishi o'zgaradimi?
5. Agar elektrodvigatel valiga bo'lgan qarshilik oshsa, elektr zanjirida qanday o'zgarishlar sodir bo'ladi?
6. Agar elektr shitdagi o'tkazgichlar o'rni almashtirilsa, elektrodvigatelning aylanish yo'nalishi o'zgaradimi?

15-a rasmning yechimi

1.

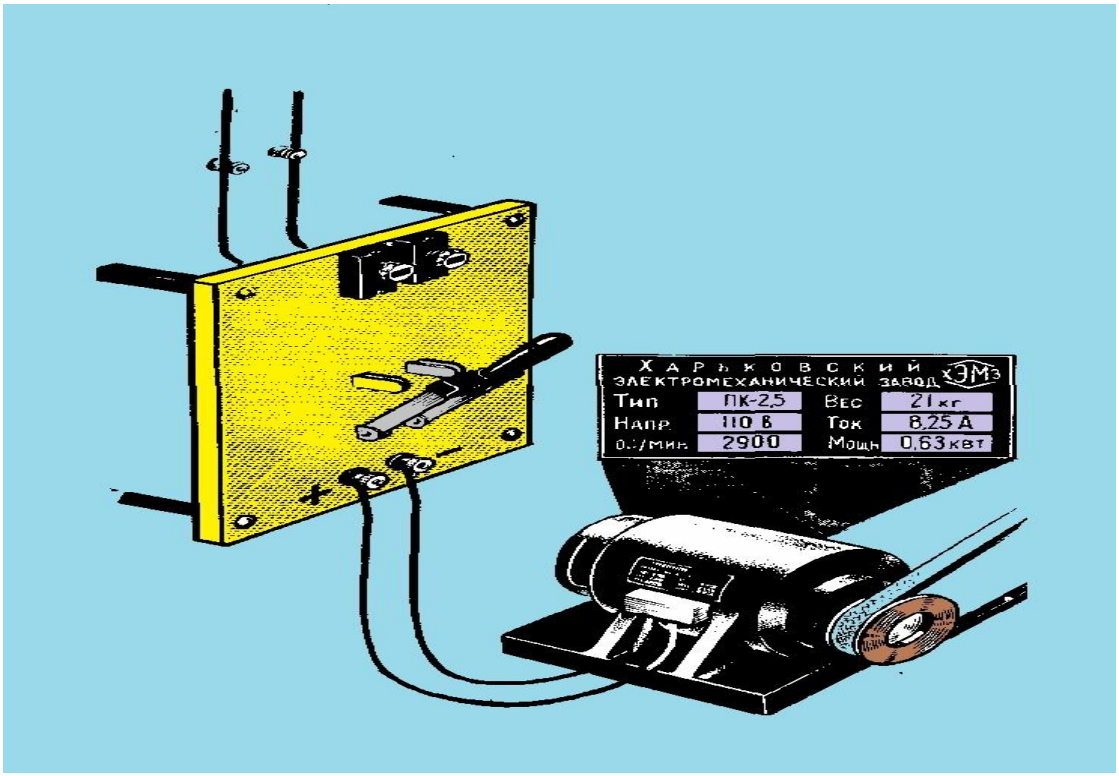


2. P = I U = 40 A 110 V = 4,4 kVt.

$\eta = \frac{P}{P_{el}} = \frac{2.5kVt}{4.4kVt} = 0,6.$

3. Elektrodvigatel valiga bo'lgan qarshilik oshganda zanjirdagi tok oshadi.

4. Elektrodvigatelning aylanish yo’nalishi o’zgarmaydi.

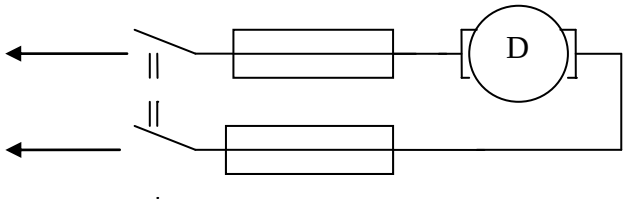


15 b rasm

1. Elektr zanjirining prinspial sxemasini chizing.
2. Elektrodvigatelning elektr quvvatini toping.
3. Elektrodvigatelning FIK ini aniqlang.
4. Agar elektrodvigatel valiga bo’lgan qarshilik kamaysa , elektr zanjirida qanday o’zgarishlar sodir bo’ladi?
5. Elektrodvigatelning aylanish yo’nalishini o’zgartirish uchun nima qilish kerak?

15-b rasmning yechimi

1.

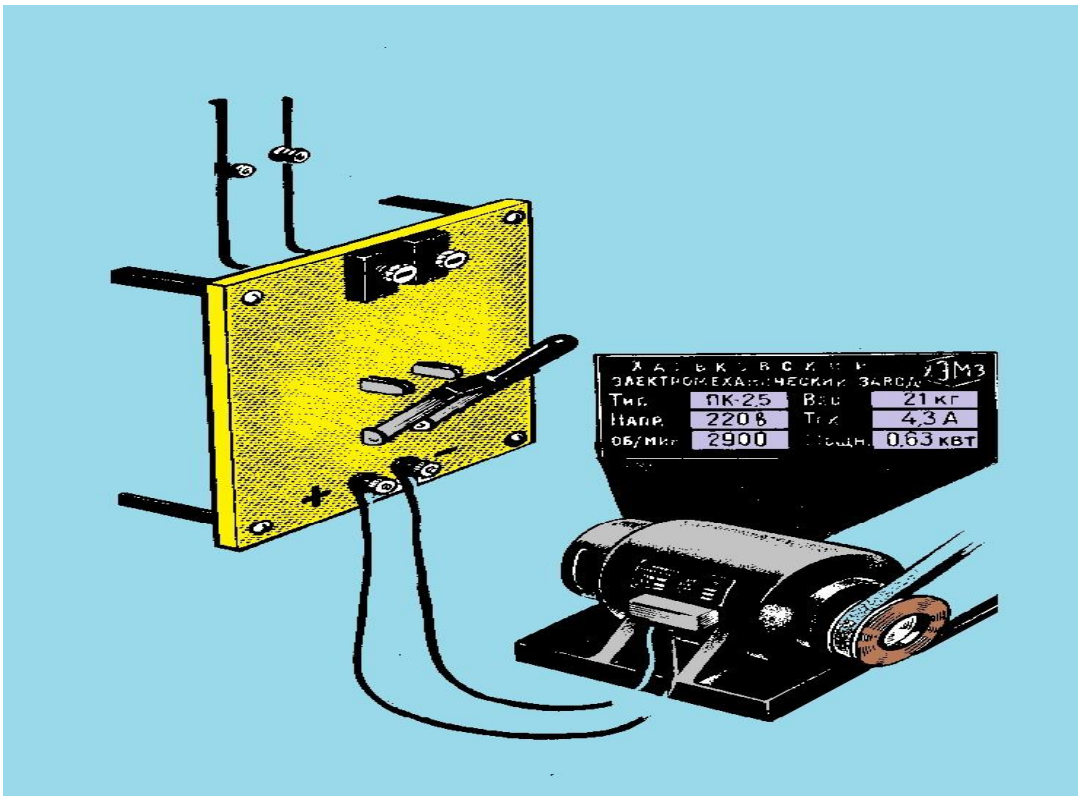


2. P = I U = 8,25 A 110 V = 0,9 kVt.

3. $\eta = \frac{P}{P_{el}} = \frac{0.63kVt}{0.9kVt}$ 100 % = 70 %.

4. Elektrodvigatel valiga bo’lgan qarshilik kamayishi bilan zanjirdagi tok kamayadi.

5. Uyg’otish chulg’ami (yoki yakor) ning ulovchi uchlari o’rnini almashtirib ulash zarur.

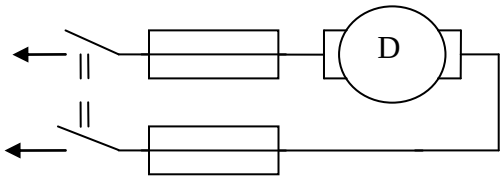


15 c rasm

1. Elektr zanjirining prinspial sxemasini chizing.
2. Elektrodvigatelning elektr quvvatini toping.
3. Elektrodvigatelning FIK ini aniqlang.
4. Agar elektrodvigatel valiga bo'lgan qarshilik oshsa , elektr zanjirida qanday o'zgarishlar sodir bo'ladi?
5. Elektr shitdagi tokli o'tkazgichlar o'rnini almashtirilsa , elektrodvigatelning aylanish yo'nalishi o'zgaradimi?

15-c rasmning yechimi

1.

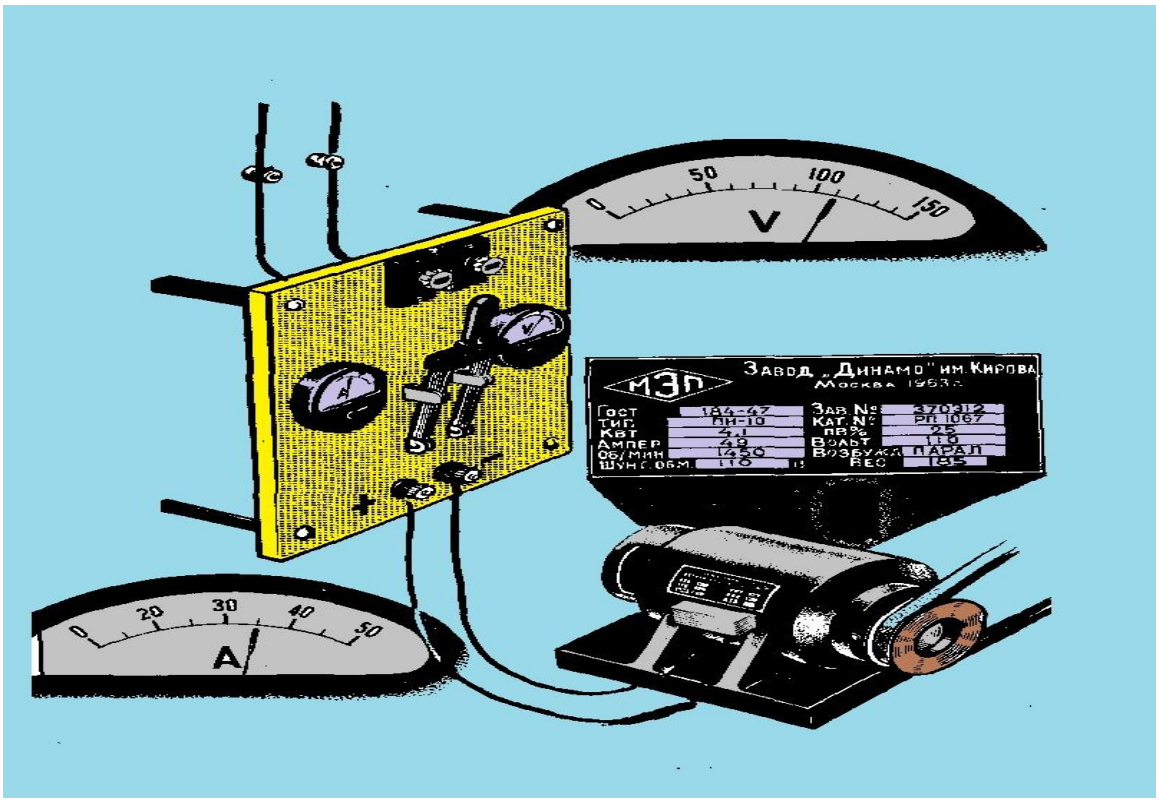


2. P = I U = 4,3 A 220 V = 0,95 kVt.

3. $\eta = \frac{P}{P_{el}} = \frac{\mathbf{0.63}\boldsymbol{kVt}}{\mathbf{0.95}\boldsymbol{kVt}} = 0,7.$

4. Elektrodvigatel valiga bo'lgan qarshilik oshishi bilan zanjirdagi tok ham oshadi.

5. Elektrodvigatelning aylanish yo'nalishi o'zgarmaydi.

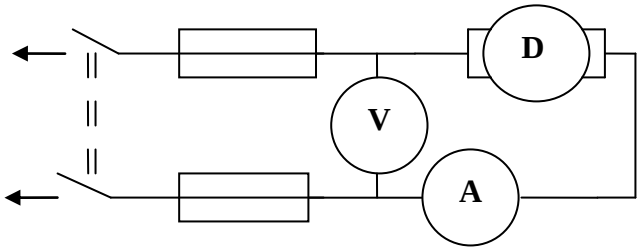


15 d rasm

1. Elektr zanjirining prinsipial sxemasini chizing.
2. Elektrodvigatelning elektr quvvatini toping.
3. Dvigatel valiga ko'rsatilayotgan qarshilik quvvati 0.5 kVt ni tashkil qilsa, elektrodvigatelning FIK ini aniqlang.
4. Agar elektrodvigatel valiga ko'rsatilgan qarshilik kamaysa, zanjirda qanday o'zgarishlar sodir bo'ladi?
5. Elektrodvigatel aylanish yo'nalishini o'zgartirish uchun nima qilish kerak?

15-d rasmning yechimi

1.



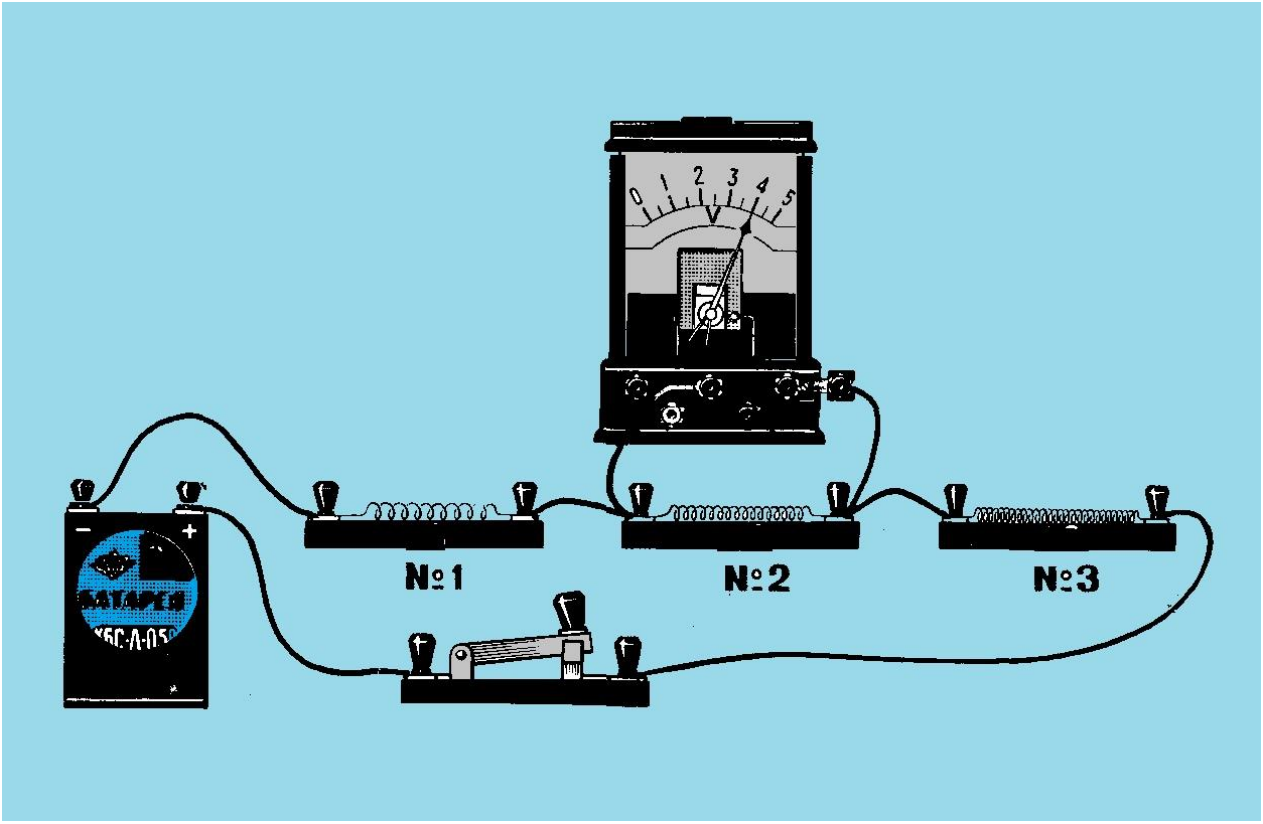
2. $P_{el} = I\ U = 49\ A \quad 110\ V \quad 5{,}39\ kVt.$

3. $\eta = \frac{P}{P_{el}} = \frac{2.5kVt}{35A\ 110V} = \frac{2.5kVt}{3.85kVt} = 0{,}65.$

4. Elektrodvigatel valiga bo'lgan qarshilik kamayishi bilan zanjirdagi tok ham kamayadi.

5. Uyg'otish chulg'ami (yoki yakor) ning ulovchi uchlari o'rnini almashtirib ulash lozim.

16-topshiriq

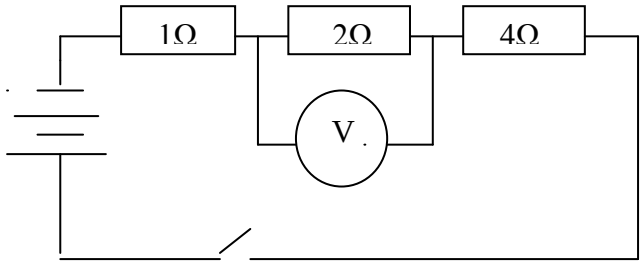


16 a rasm

1. Yechimida tasvirlangan zanjirning elektr sxemasini chizing.
2. № 1 qarshilikdagi tok kuchini toping.
3. № 3 qarshilikdagi kuchlanishni toping.
4. Batareya qisqichlaridagi kuchlanishni toping.
5. Agar zanjirdagi № 3 qarshilik olib tashlansa, voltmeter ko'rsatishi qanday o'zgaradi?

16-a rasmning yechimi

1.

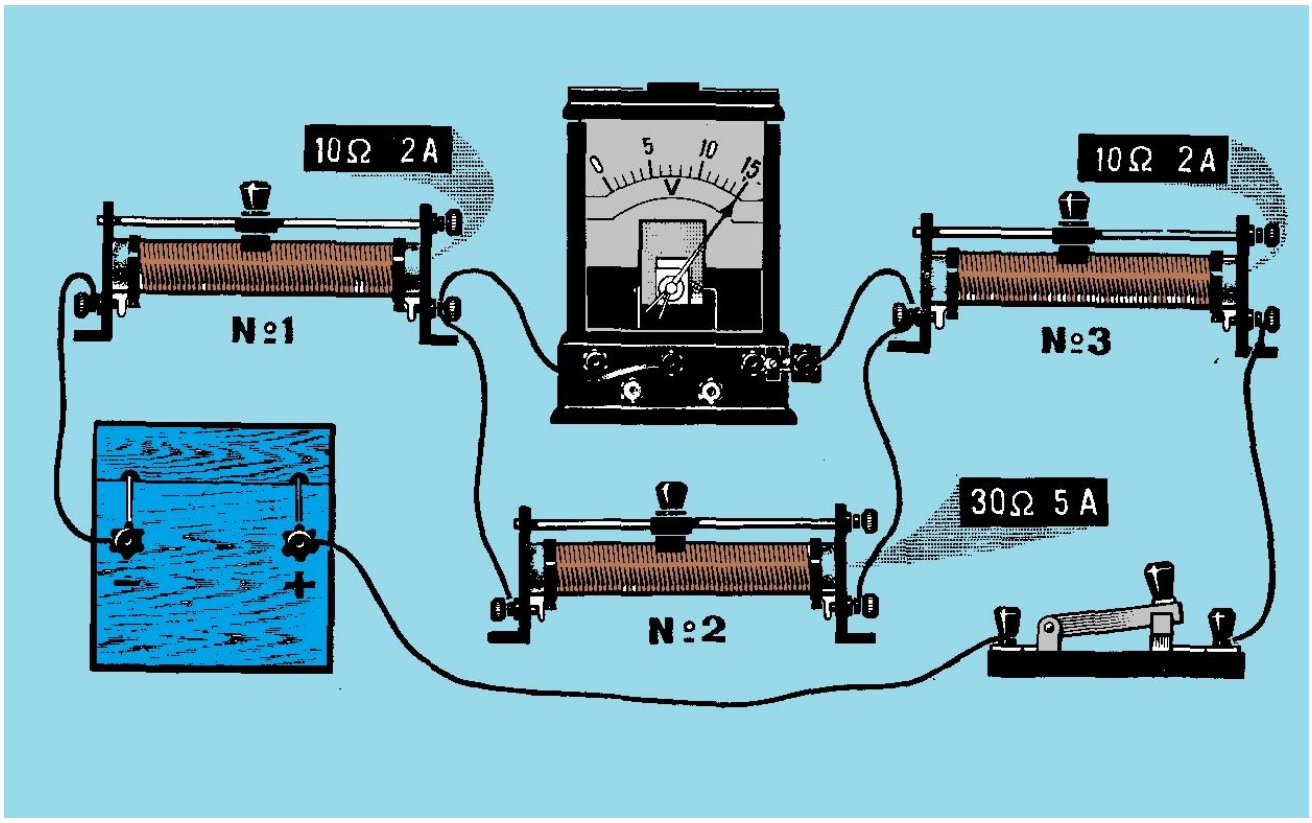


2. $I = \frac{4V}{2\Omega} = 2$ A.

3. $U = 4 \cdot 2$ A $= 8$ V.

4. $U_{bat} = I R_{zan} = 2$ A $(1\ \Omega + 2\Omega + 4\Omega) = 14$ V.

5. Voltmetr katta qiymatni ko'rsatadi, chunki zanjir qarshiligi kamayadi, tok oshadi va № 2 qarshilikdagi kuchlanish oshadi.

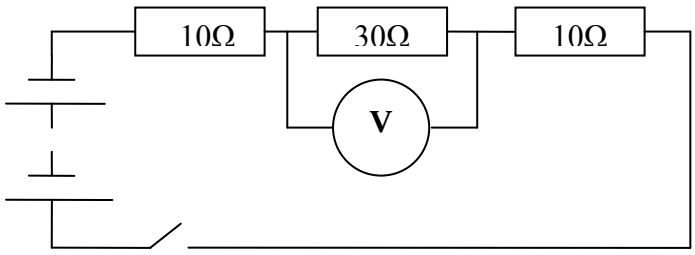


16 b rasm

1. Yechimidagi tasvirlangan elektr zanjirining sxemasini chizing.
2. № 1 reostatdagi tok kuchini aniqlang.
3. № 2 reostatdagi kuchlanishni aniqlang.
4. Akumulyator qisqichlaridagi kuchlanishni aniqlang.
5. Agar № 2 qarshilik zanjirdan olib tashlansa, voltmeter ko'rsatishi qanday o'zgaradi?

16-b rasmning yechimi

1.

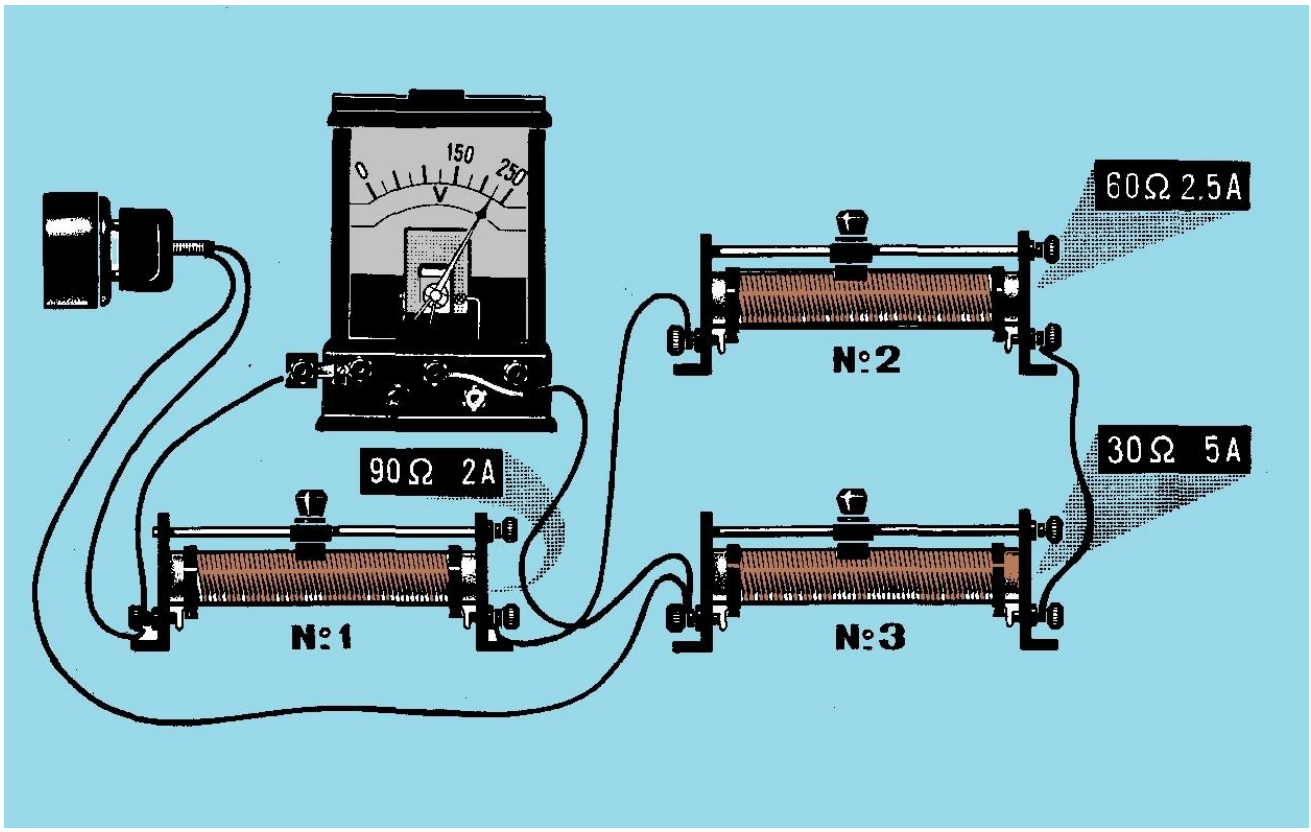


2. $I = \frac{15V}{30\Omega} = 0{,}5$ A.

3. $U = 0{,}5\ A \cdot 10\ \Omega = 5$ V.

4. $U_{bat} = 0{,}5\ A\ (10\ \Omega + 30\ \Omega + 10\ \Omega) = 25$ V.

5. Kuchlanish oshadi va berilgan voltmetr uchun qo'yilishi mumkin bo'lganidan yuqori qiymatga erishadi. Bu kuchlanish batareya qisqichlaridagi kuchlanishga taxminan teng bo'ladi.

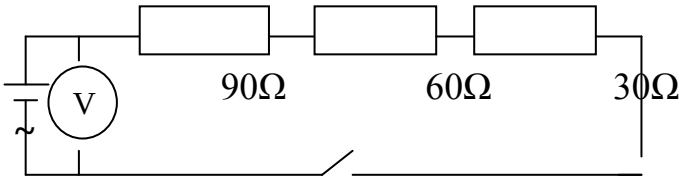


16 c rasm

1. Yechimida tasvirlangan zanjirning elektr sxemasini chizing.
2. № 2 reostatdagi tok kuchini aniqlang.
3. № 3 reostatdagi kuchlanishni aniqlang.
4. Zanjir qisqichlariga berilishi mumkin bo'lgan maksimal kuchlanishni aniqlang.
5. Zanjirga yana bitta rheostat ketma-ket ulansa, voltmeter ko'rsatishi qanday o'zgaradi?

16-c rasmning yechimi

1.

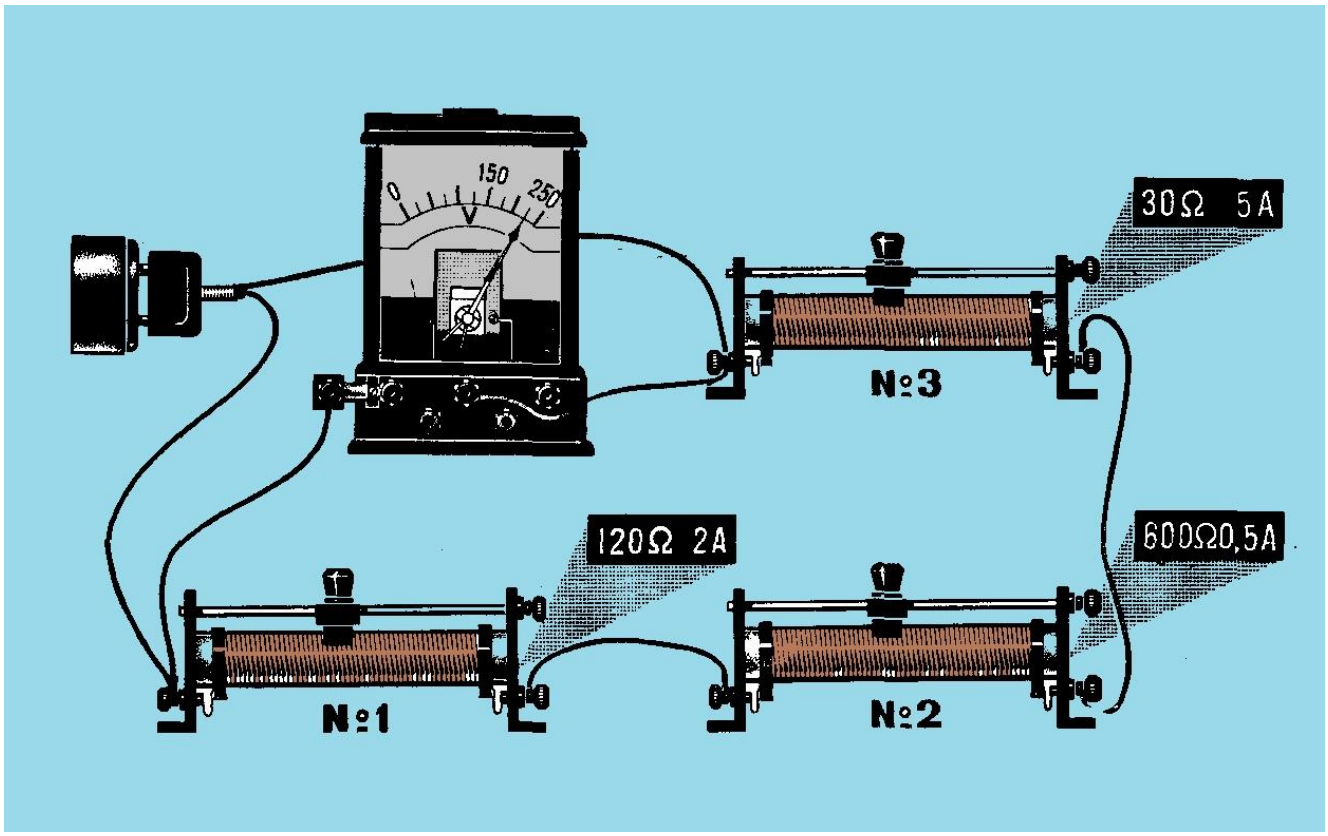


2. $I = \frac{225V}{180\Omega} = 1{,}25$

3. $U = 1{,}25\ A \cdot 30\ \Omega = 37{,}5\ V.$

4. $U_{max} = 2\ A\ (30\ \Omega + 60\ \Omega + 90\ \Omega) = 360\ V.$

5. Zanjir qarshiligi oshadi. Zanjirdagi tok kamayadi. Voltmetr ko'rsatishi oshadi, ammo, katta quvvatga ega bo'lgan tok manbaiga nisbatan bu kam farq qiladi.

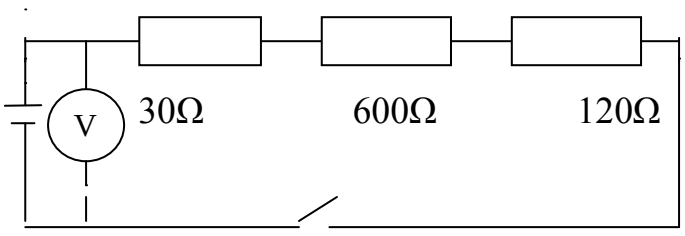


16 d rasm

1. Yechimida tasvirlangan zanjirning elektr sxemasini chizing.
2. № 2 reostatdagi tok kuchini aniqlang.
3. № 3 reostat uchlaridagi kuchlanishni aniqlang.
4. Elektr zanjirida qanday maksimal tok kuchiga ega bo'lishi mumkin?
5. № 2 reostat zanjiridan olib tashlansa, elektr zanjirida qanday o'zgarishlar sodir bo'ladi?

16-d rasmning yechimi

1.



2. $\boldsymbol{I = \frac{225V}{750\Omega} = 0.3A}$

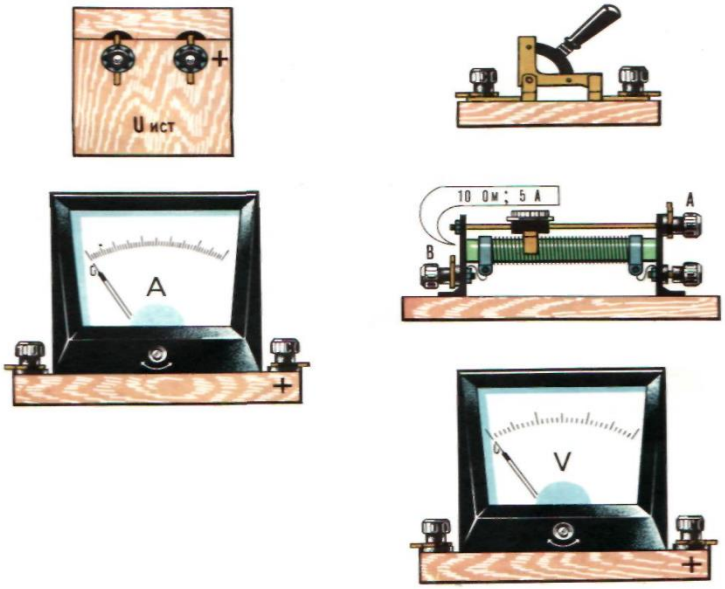
3. U = 0,3 A 30 Ω = 9 V.

4. Imax = 0,5 A.

5. Zanjir qarshiligi kamayadi. Tok oshadi. Manba qisqichlaridagi kuchlanish deyarli o'zgarmasdan qoladi, chunki tok manbai quvvati yetarli darajada katta.

Mustaqil ishlash uchun topshiriqlar

1-topshiriq



Manbaning kuchlanishi (Umanba), V	6	12	120
Ampertmetrning eng yuksak toki (In), A	1	2,5	50
Voltmetrning eng yuksak kulanishi (Un), V	3	7,5	150

1. Rasmni (uni butligini saqlash uchun) plyonka yoki kalka bilan yoping va biriktiruvchi simlarni tasvirlovchi chiziqlar bilan elektr zanjir elementlari qisqilarini shunday usulda ulangki A va V qisqichlar oralig'idagi reostatning ulanish qismi qarshiligini o'lchash uchun elektr zanjir sxemasi chiqsin.

2. Tasvirlangan elektr zanjirning printsipial sxemasini chizing va unda elektr o'lchov asboblari qisqichlarining qutbliligini ko'rsating.

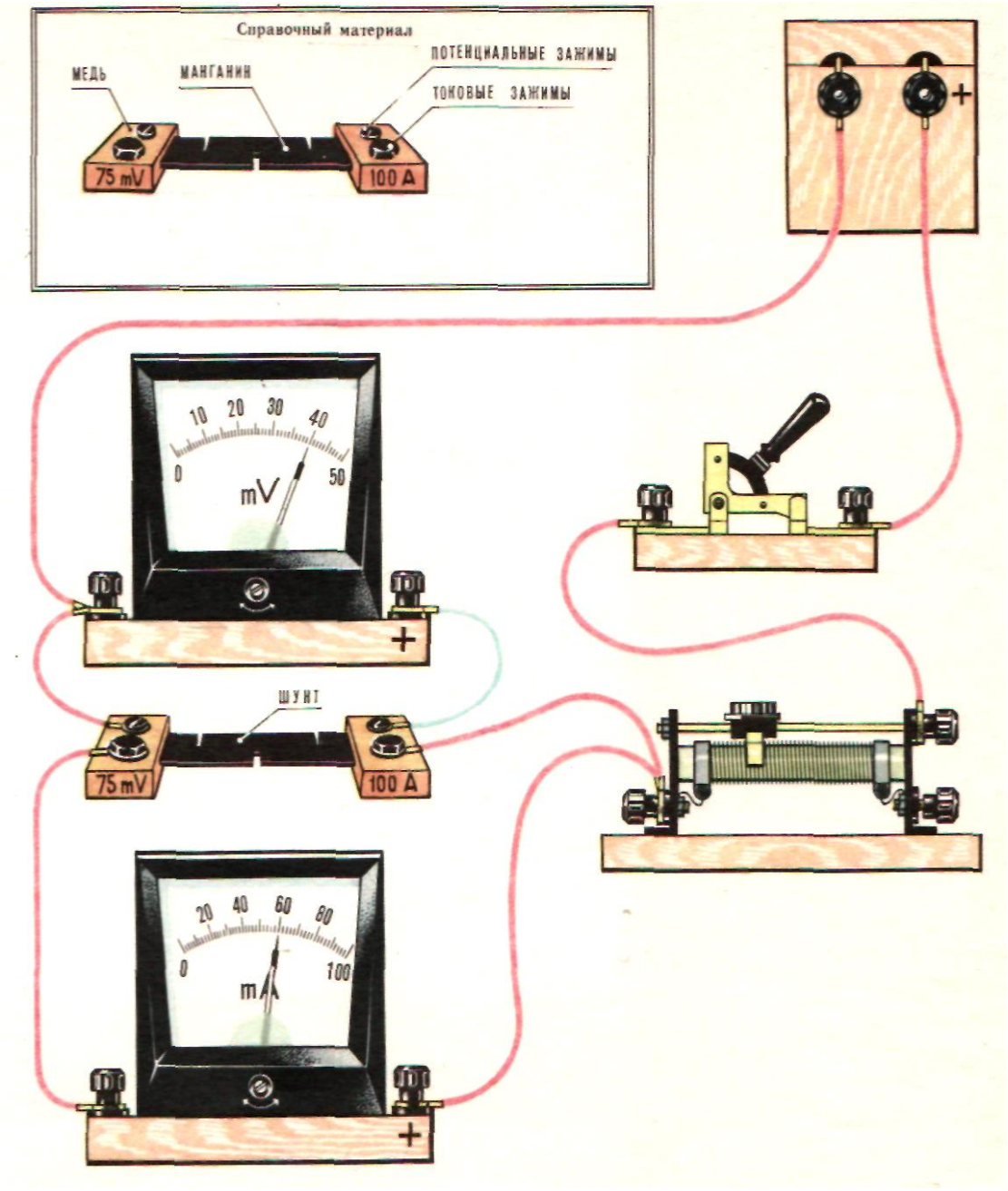
3. O'lchamlarning aniqligini oshirish uchun asboblarni shunday tanlash lozimki, o'lchanayotgan miqdorning ahamiyati asbob shkalasining ikkinchi yarmiga tushsin.

Keltirilgan Echimidan foydalanib, manbaning (Umanba) kuchlanish ahamiyatini tanlang. Ushbu manba uchun A va V qisqichlar oralig'idagi reostatning ulanish qismi qarshiligini o'lchash maqsadida ampermetrning (In) tok kuchi va voltmetrning (Un) kuchlanish eng yuksak ahamiyatini tanlang:

Umanba=….; Un=….; In=….

1. Voltmetr kuchlanishi va ampermetr tok kuchi tanlangan nominal ahamiyatlari uchun tasvirlangan asboblar shkalalarini raqamlang.

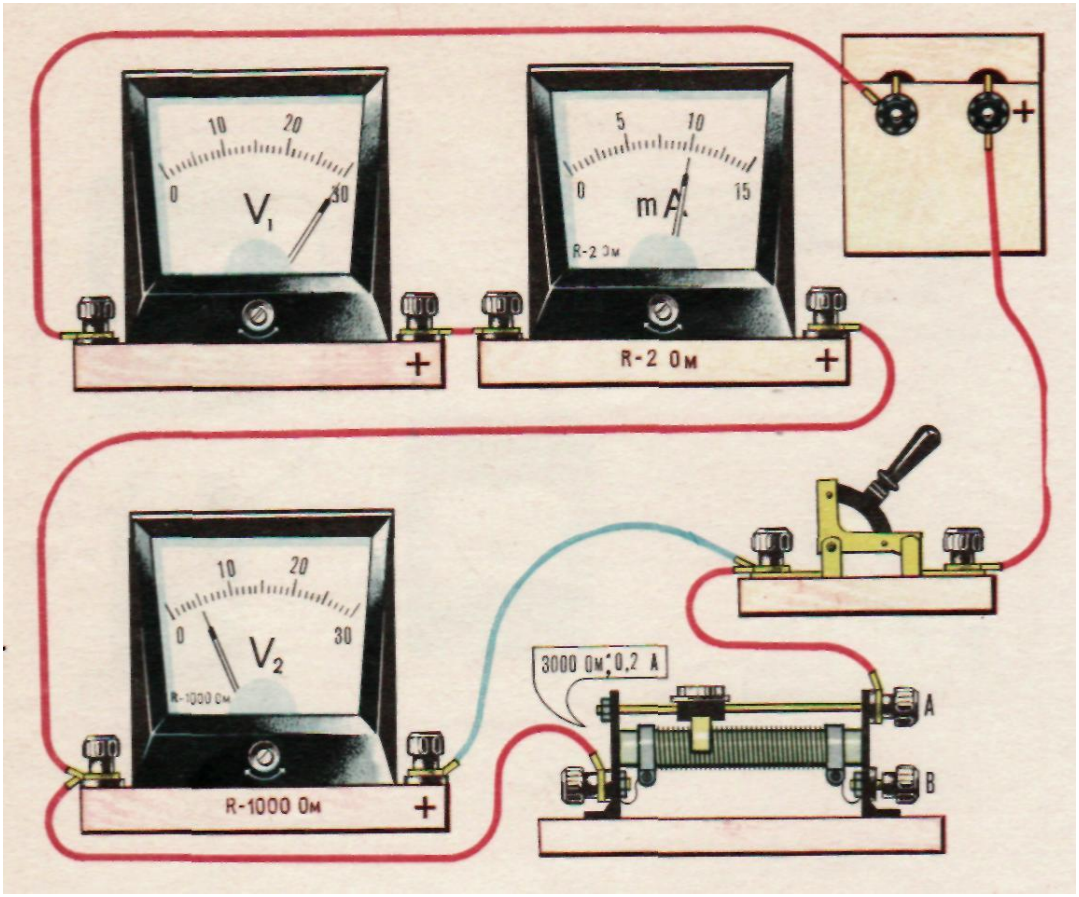
2-**topshiriq**



Rasmda tok kuchini o‘lchash uchun 3 A gacha bo‘lgan shuntli milliampermetr ishlatilgan elektr zanjir tasvirlangan.

1. Shuntning qarshiligini aniqlang.
2. Milliampermetr shkalasini qaytadan chizing va amperlarda uni darajalab chiqing.
3. Shuntning markasini tushuntiring.

3-topshiriq

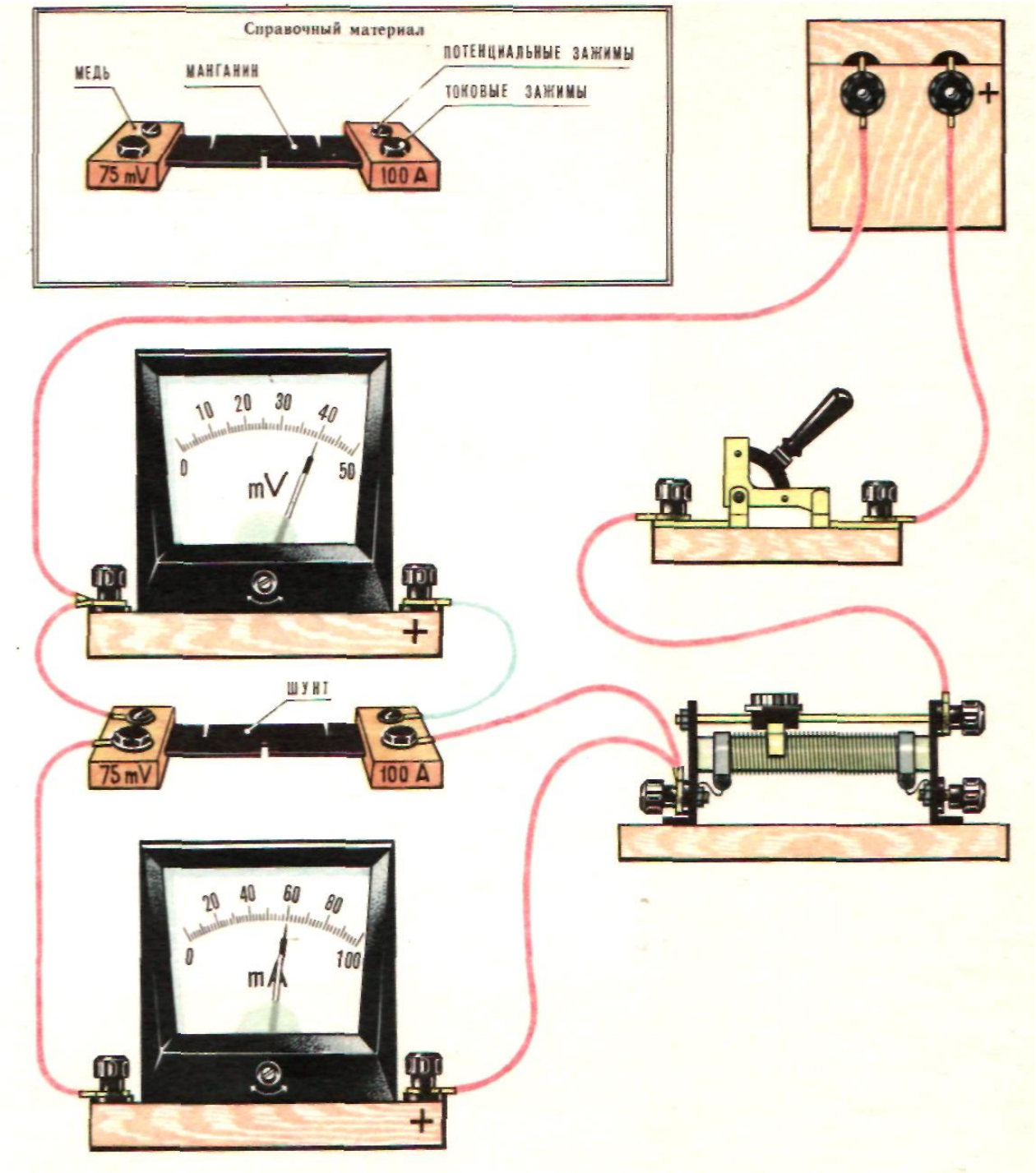


Aniq o‘lchovlar uchun mo‘ljallangan elektr asboblarining shkalalarida o‘zining qarshilik o‘lchami haqidagi ma’lumotlarga ega, u yetarli darajada keng chegaralarda tebranishi mumkin.

Bir turdagi volьtmetrlarda bu narsa odatda o‘lchovning yuqori chegarasi oshishi bilan o‘sadi, ampermetrlarda esa – kamayadi.

1. Tasvirlangan elektr zanjirini so‘zlar bilan tushuntirib bering.
2. Rasmda keltirilgan elektr zanjiridagi voltmetr V1 qanaqa kuchlanishni o‘lchaydi?
3. Voltmetrning V1 ichki kuchlanishini aniqlang.
4. Milliampermetrdagi kuchlanishining pasayishi nimaga teng?
5. Voltmetrdagi V2 tok kuchini toping.
6. Reostatdagi (Ip) tok kuchini hisoblang.
7. Reostat (Rp) ulangan qismining qarshiligi hisobini chiqaring.
8. Batareya (Umanba) qisqichlaridagi kuchlanish ahamiyatini hisoblang.
9. Jami tashqi zanjirning (R) quvvatini toping.
10. Agar reostatning A va V qisqichlarini ulasa asboblar ko‘rsatishi o‘zgaradimi? Javobni asoslang.

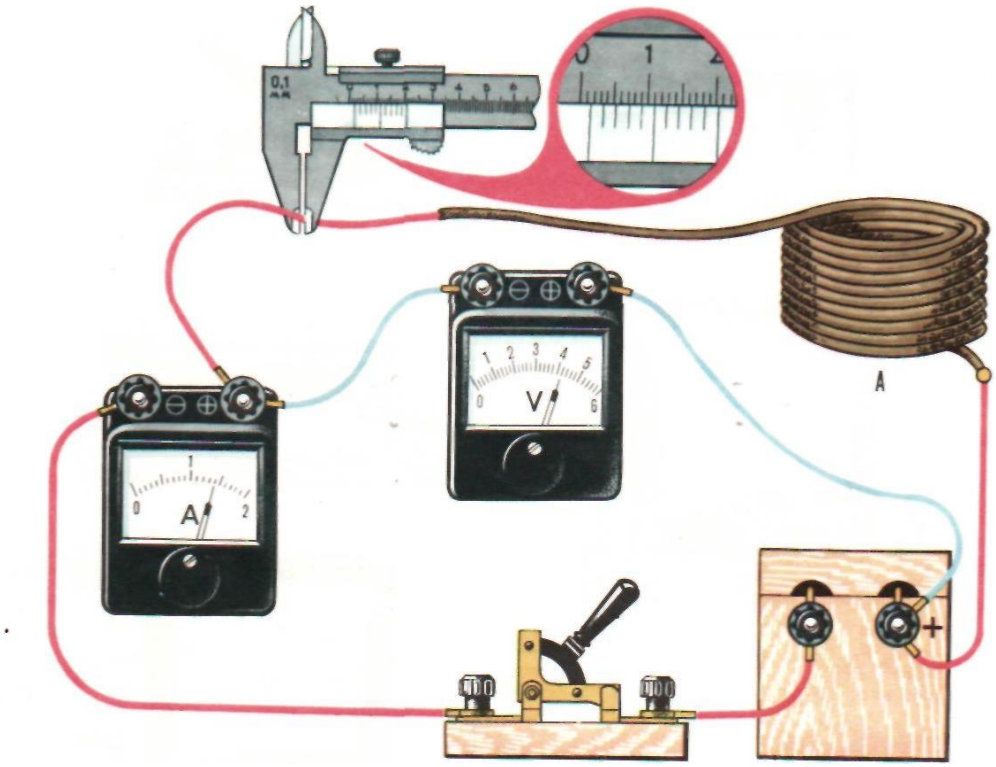
4-topshiriq



Rasmda tok kuchini o‘lchash uchun 5 A gacha bo‘lgan shuntli milliampermetr ishlatilgan elektr zanjir tasvirlangan.

1. Shuntning qarshiligini aniqlang.
2. Milliampermetr shkalasini qaytadan chizing va amperlarda uni darajalab chiqing.
3. Shuntning markasini tushuntiring. 75 mV, 100A.

5-topshiriq



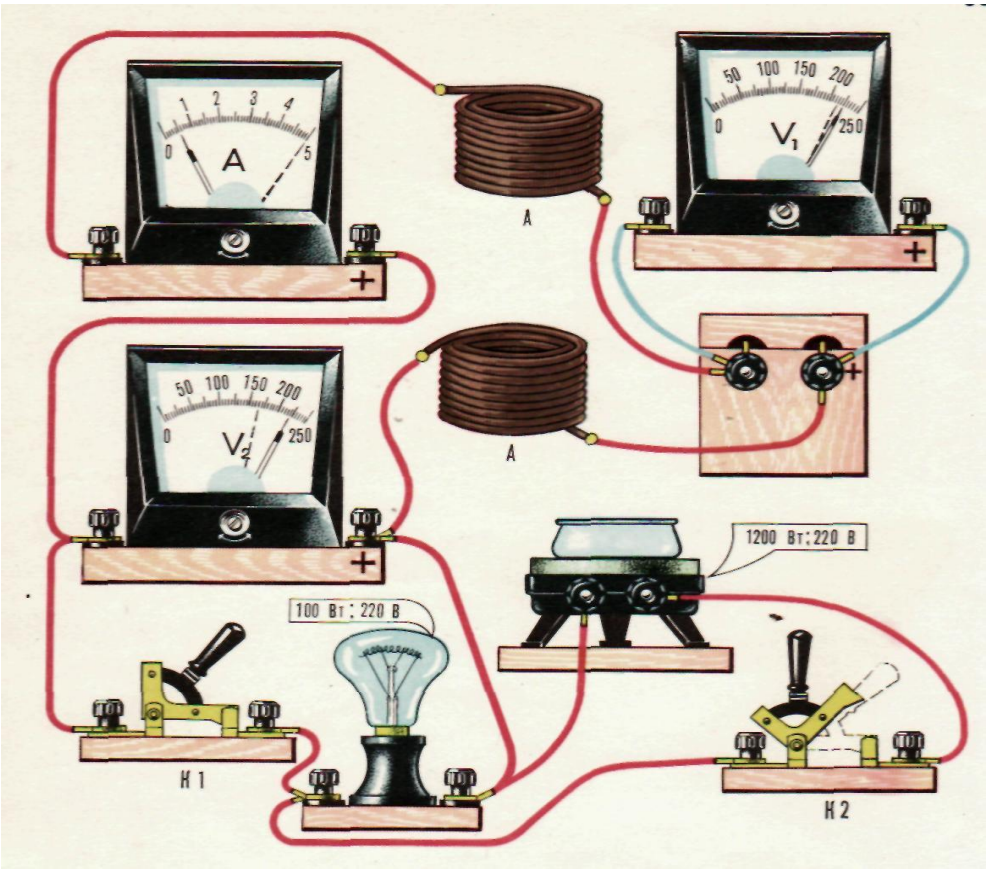
Yo‘naltiruvchi ma’lumotlar

1. $I = \frac{U}{R}$–zanjir qismi uchun Om qonuni;
2. $S = \pi r^2 = \frac{\pi d^2}{4}$ – doira maydoni (kesim) π=3,14;
3. $R = \frac{\rho l}{S}$ – o‘tkazuvchining qarshiligi.

Nikelli sim A kalavasi rasmda ko‘rsatilganidek elektr zanjirga ulangan.

1. Tasvirlangan elektr zanjirini so‘z bilan tasvirlang.
2. Tasvirlangan elektr zanjirining printsipial sxemasini chizing. Unda elektr o‘lchov asboblari qisqichlarining qutblarini (+, -) belgilar bilan belgilang, ko‘rsatkichlar bilan esa – zanjirdagi tok yo‘nalishini.
3. Nikellangan simning kesim maydonini aniqlang.
4. Nikellangan sim kalavasining qarshiligini aniqlang.
5. Agar nikellangan simning solishtirma qarshiligi ρ=4,2*10-7 Om*m bo‘lsa uning uzunligini aniqlang.

6-topshiriq

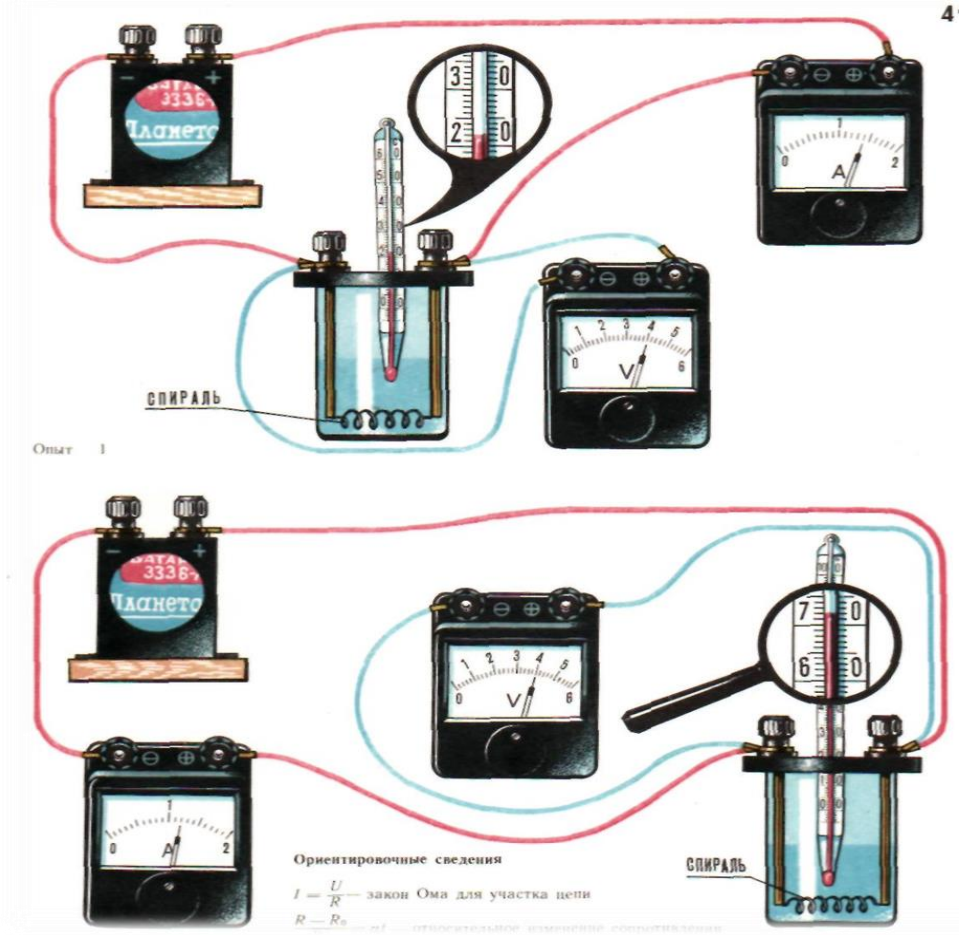


Rasmda tasvirlangan elektr zanjirida tok manbai elektr energiyasi iste'molchilaridan ancha masofaga uzoqlashtirilgan. Bunday zanjir ishining tahlilida liniyaning (olib kelingan simlar) qarshiligini hisobga olish zarur. Rasmlardagi biriktiruvchi simlar qarshilikka ega emas deb hisoblanadi. Shuning uchun, har bir olib kelingan simga ulangan A sim kalavasida liniyaning har bir simida qarshilik joylangan deb faraz qilamiz.

K1 kalitning ulangan holatida ampermetr strelkasining vaziyati yaxlit chiziq bilan, K1 va K2 kalitlarning tutashuvida esa chiziqli ko'rsatilgan.

1. Tasvirlangan elektr zanjirning printsipial sxemasini chizing.
2. Tasvirlangan elektr zanjirini so'zlar bilan tasvirlang.
3. Nima uchun plitka ishlaganda voltmetr ko'rsatgichlari kamayadi?
4. Manbadan elektr energiyasi iste'molchilarigacha olib keluvchi simlar liniyasining Rl qarshiligini hisoblang.
5. EYuK manbaini aniqlang.

7-topshiriq



Yo‘naltiruvchi ma’lumotlar

..... zanjir qismi uchun Om qonuni

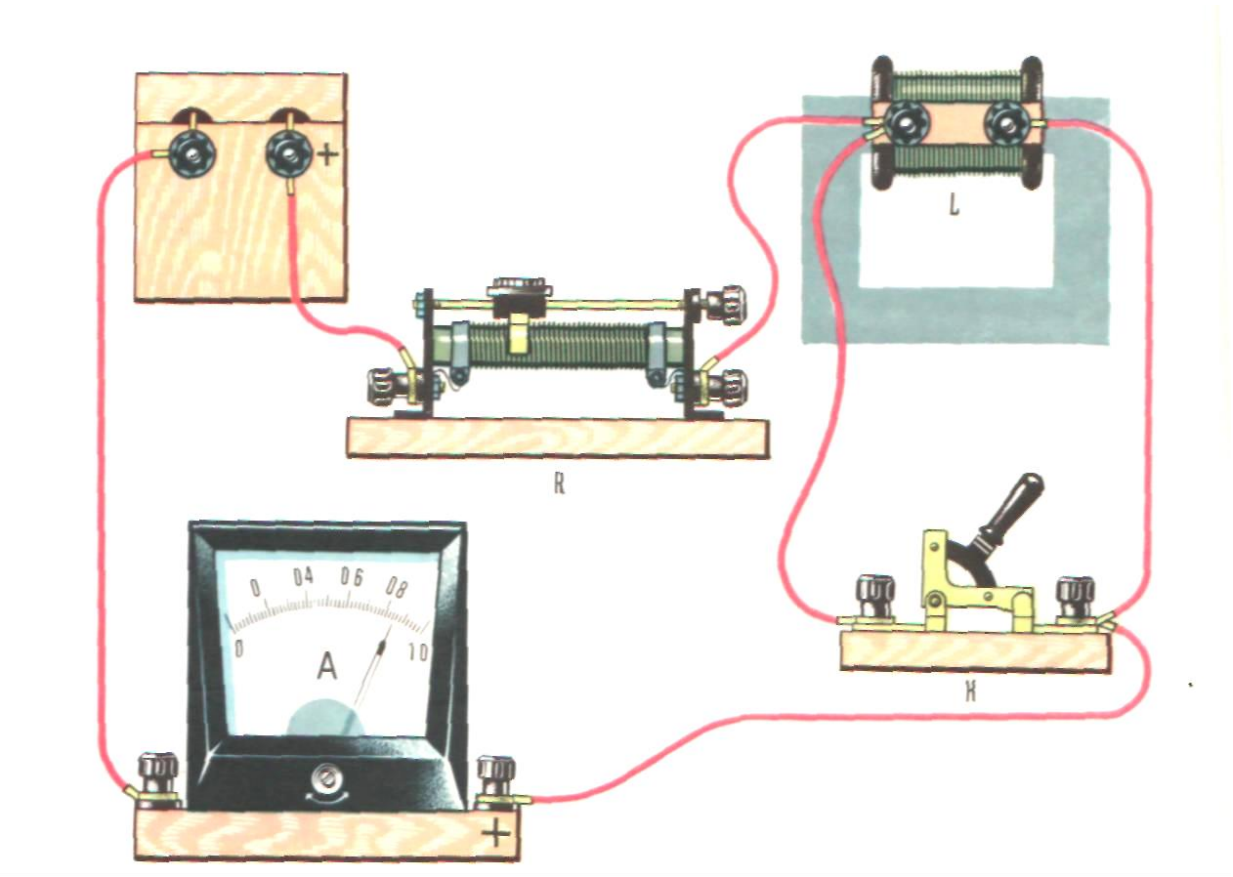
..... qiziganda o‘tkazgich qarshiligining nisbatan o‘lchanishi

Bitta spiralni boshida nisbatan sovuq suvga (1 tajriba), undan so‘ng nisbatan qaynoq suvga solindi (2 tajriba).

Spiral rasmda tasvirlangan elektr zanjiriga ulangan.

Spiral materiali qarshiligi haroratli koeffitsientini aniqlang.

8-topshiriq

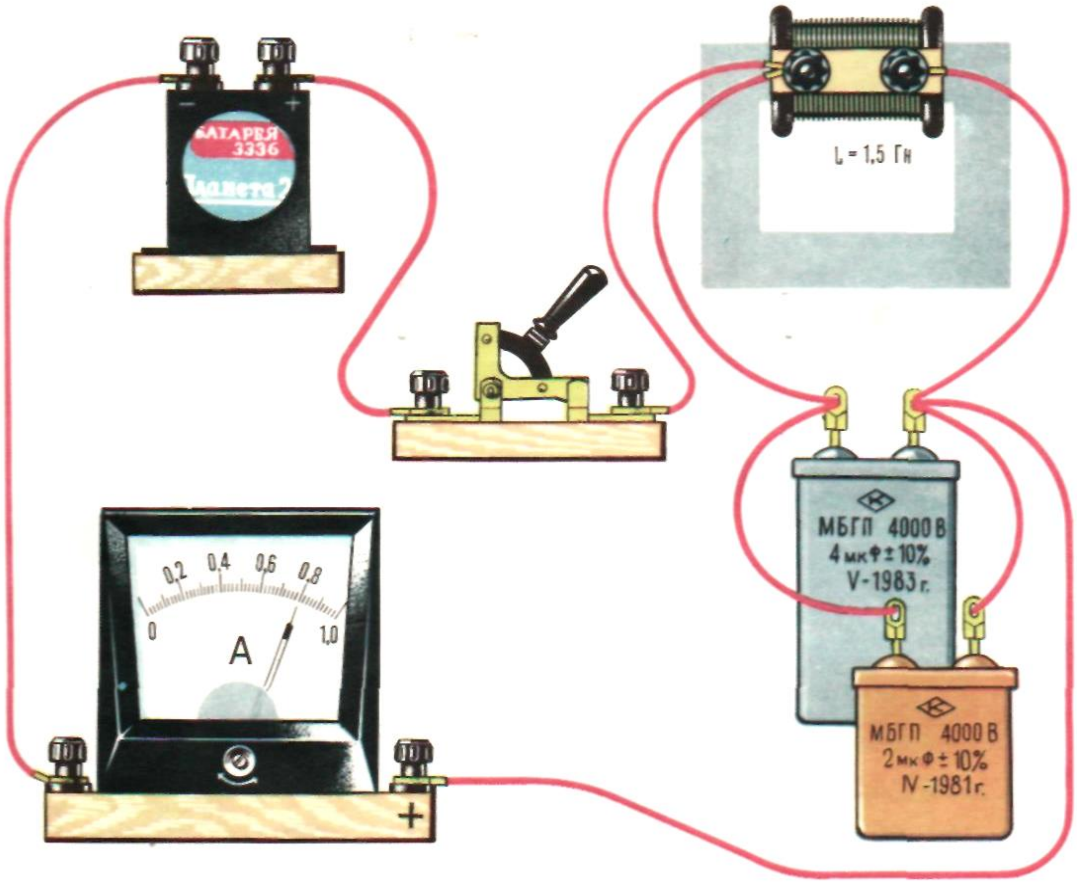


Magnit qutblari o‘rtasida ikkita gorizontal metall AV va A`B` yo‘naltiruvchilar o‘rnatilgan. Ushbu yo‘naltiruvchilarning (AA`) boshi elektrostatik voltmetr bilan qo‘shilgan.

Yo‘naltiruvchilar bo‘ylab engil metall naycha sirg‘anmoqda. Dastlab naycha AA` nuqtalar bilan to‘g‘ri keladi, so‘ngra VV` nuqtalarga etadi va yana dastlabki holatga qaytdi. Naycha harakati Yechimii rasmda ko‘rsatilgan.

Naychaning harakati vaqti vazifasi sifatida yo‘naltiruvchilar va harakatchan naycha tashkil qilgan konturning ichidan o‘tuvchi (F) magnit oqim va EYuK Yechimini tuzing. Yechimilarni masshtabda tuzing.

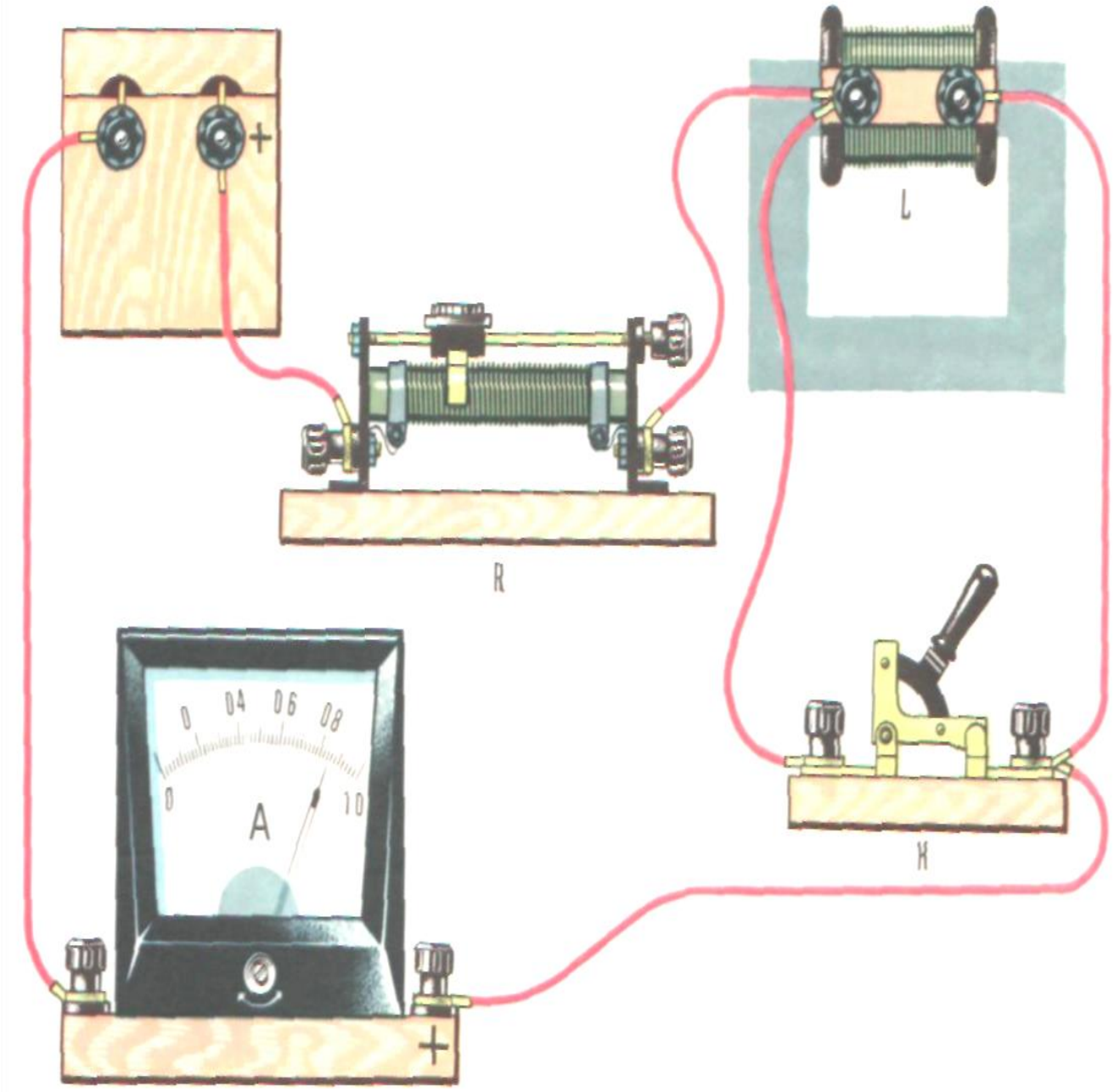
9-topshiriq



Rasmda katta induktivlikka va juda kam qarshilikka ega bo‘lgan tutashgan o‘zakli kalava kiritilgan elektr zanjir tasvirlangan.

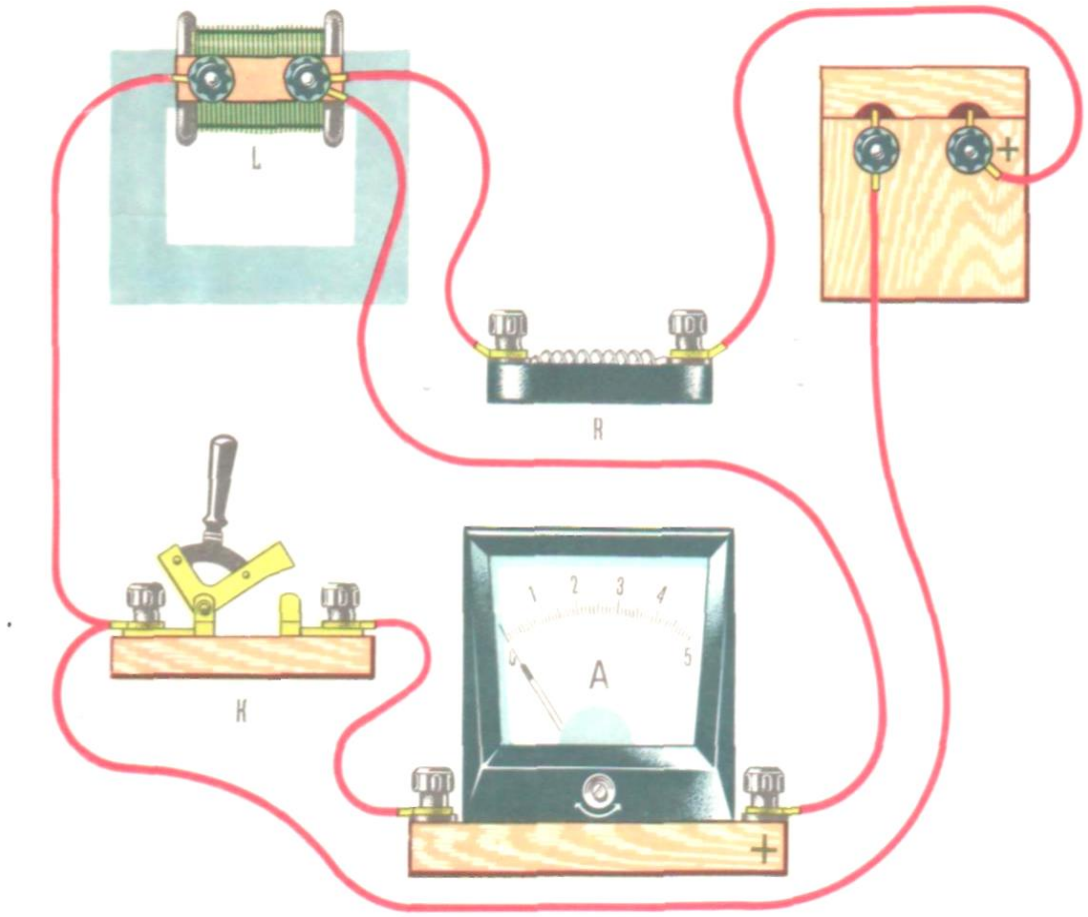
Kondensatli batareya kalitini o‘zishda maksimal kuchlanishni aniqlang.

10-topshiriq



Rasmda ulangan kalitli K elektr zanjiri tasvirlangan.
Ampermetr orqali o‘tuvchi tok kuchi Yechimini chizing va kalitning uzilishi paytidagi shaklini tushuntiring.

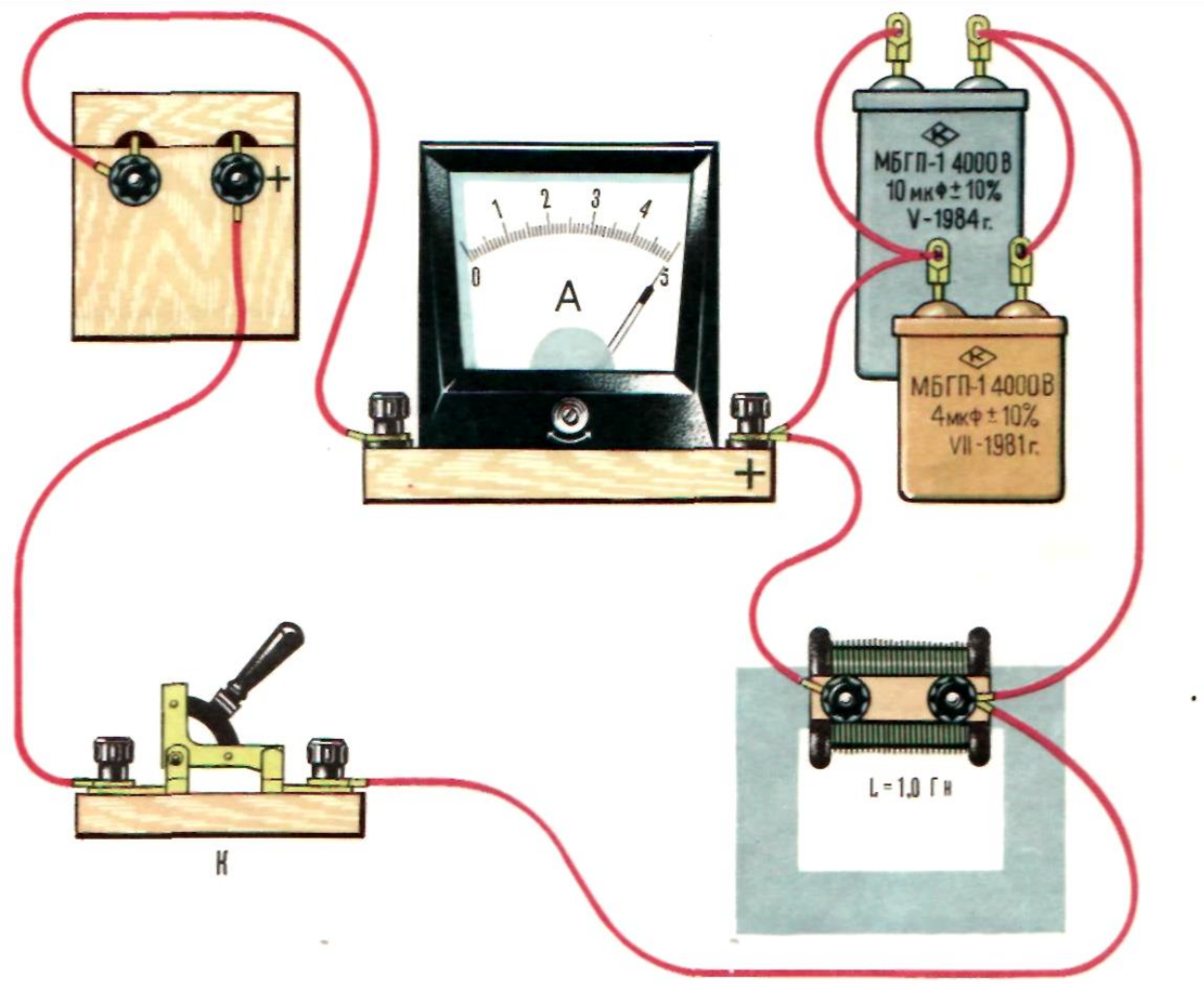
11-topshiriq



Rasmda ulangan kalitli K elektr zanjiri tasvirlangan.

Ampermetr orqali o‘tuvchi tok kuchi Yechimini chizing va kalitning o‘zilishi paytidagi shaklini tushuntiring.

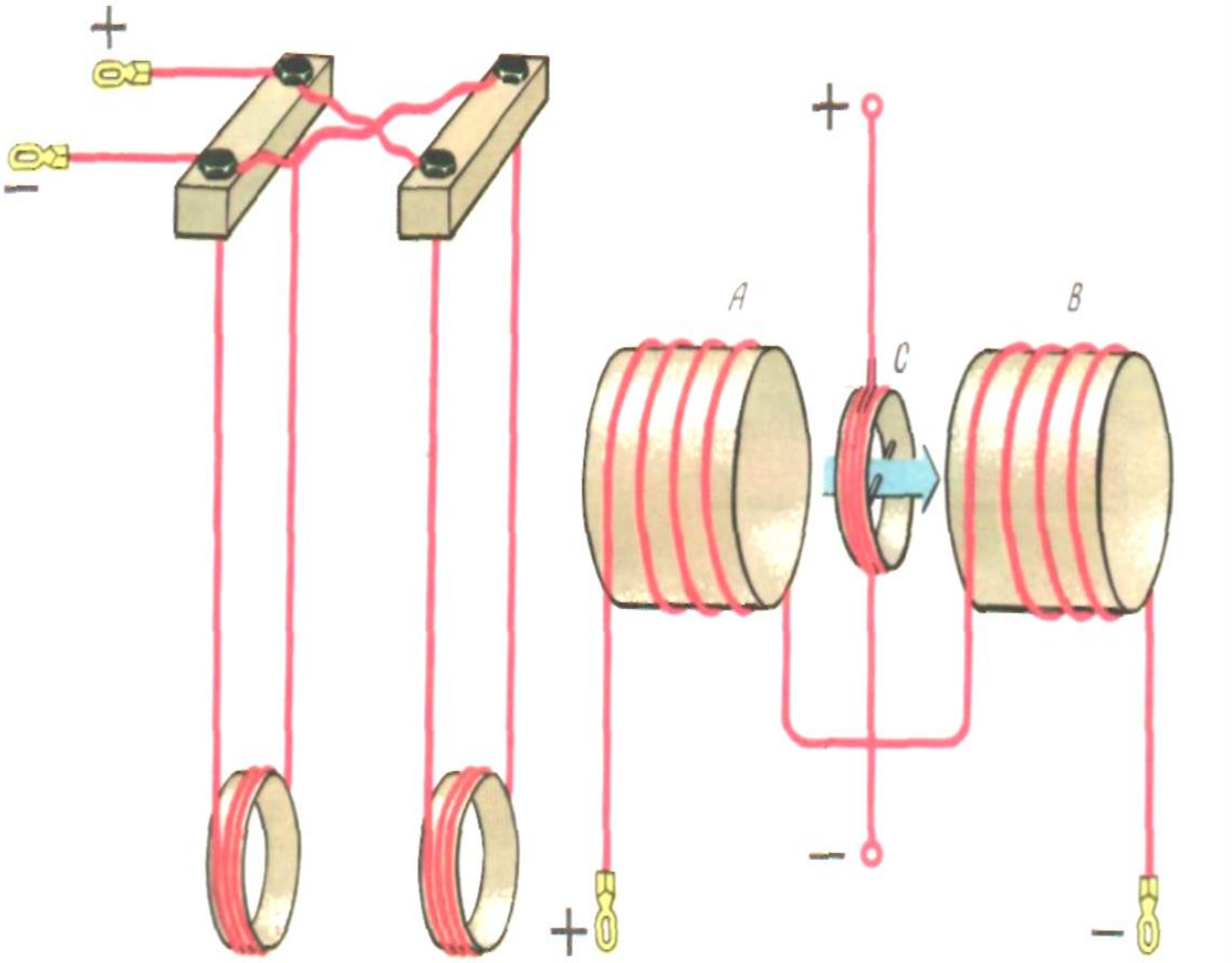
12-topshiriq



Rasmda katta induktivlikka va juda kam qarshilikka ega bo‘lgan tutashgan o‘zakli kalava kiritilgan elektr zanjir tasvirlangan.

Kondensatli batareya kalitini uzishda maksimal kuchlanishni aniqlang.

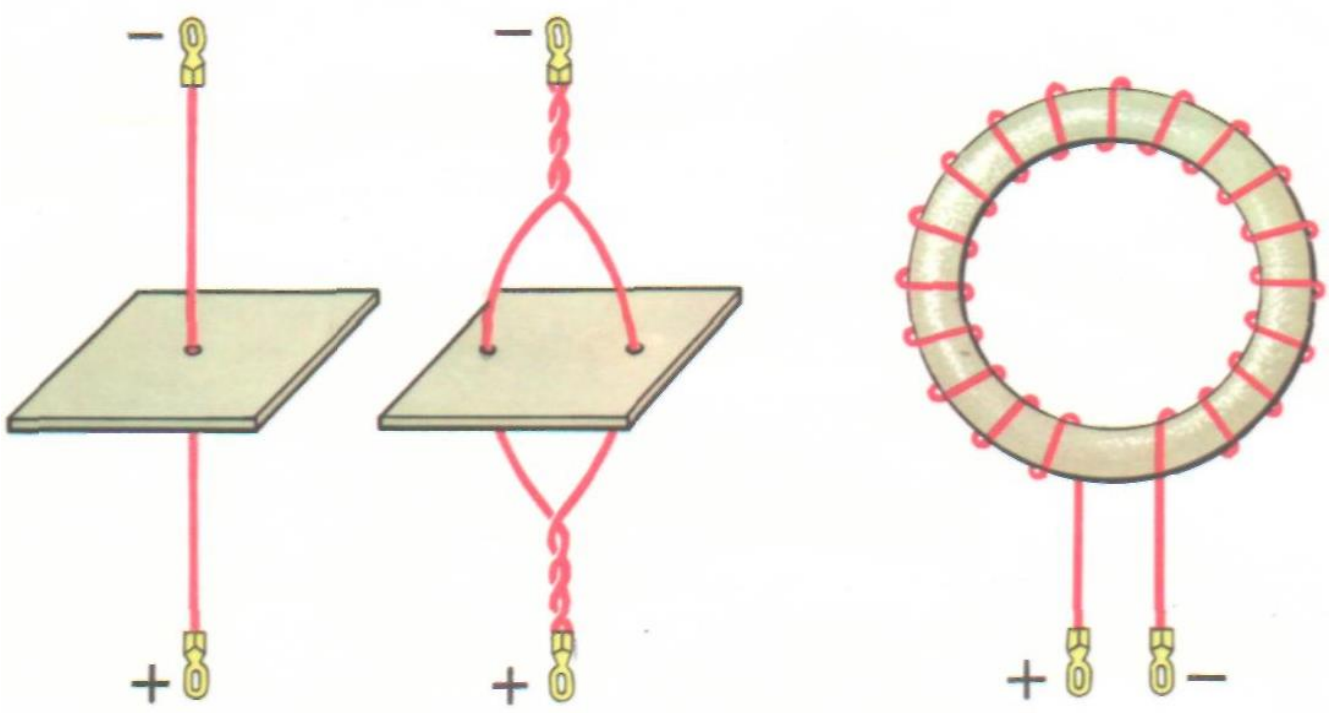
13-topshiriq



1- rasmda kalavalar ko‘rsatilgan, ular o‘rami oxirlari yetarlicha uzun va maxsus qisqichlarda mahkamlangan. Kalavalar oxirlarini tok manbai bilan ulanishi rasmda ko‘rsatilgan. Kalavalar o‘zaro ta’siri tavsifini aniqlang va ular magnit maydoni sxemasini daftarga chizing. 2 rasmda A va V kalavalar tasvirlangan. Kalavalar orasida ingichka egiluvchan simlarda S kalava osib qo‘yilgan. Ushbu kalava ichida strelka mahkamlangan.

Hamma kalavalarda tok hosil bo‘lganda ushbu strelka holatini aniqlang.

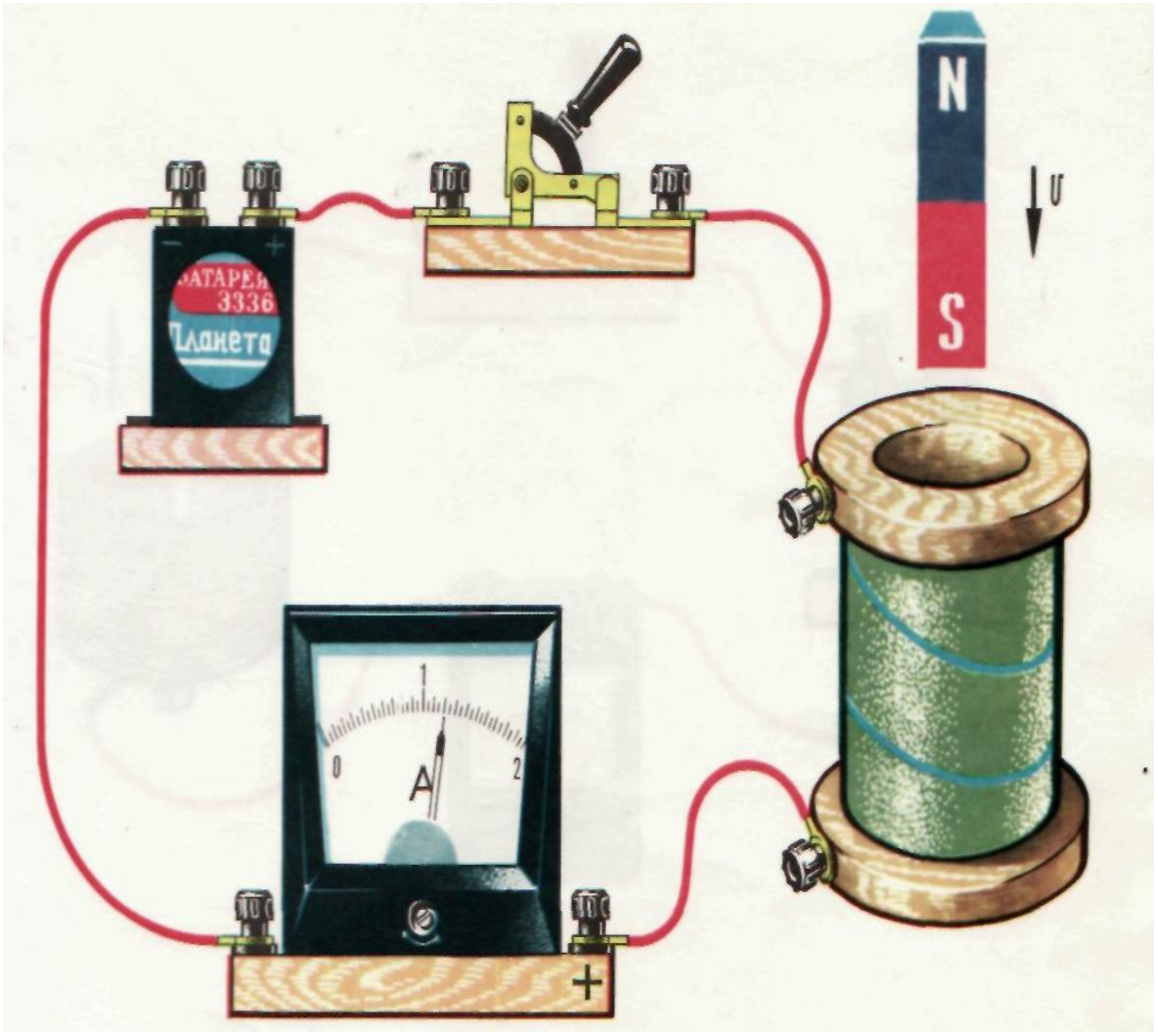
14-topshiriq



1- rasmda karton to‘siq (ekran) orqali o‘tuvchi to‘g‘ri o‘tkazuvchi ko‘rsatilgan, uning tekisligi o‘tkazuvchiga perpendikulyar. 2 rasmda karton to‘siq (ekran) orqali o‘tuvchi ikki tarmoqqa tilingan sim, 3 rasmda yaxlit o‘ramga ega toroid yog‘och o‘zak tasvirlangan.

Daftarlarda to‘siqlar tekisliklarida to‘g‘ri va tilingan o‘tkazuvchining magnit maydonlari sxemalarini va rasmdagi toroid o‘ramning magnit maydoni ko‘rinishini chizing.

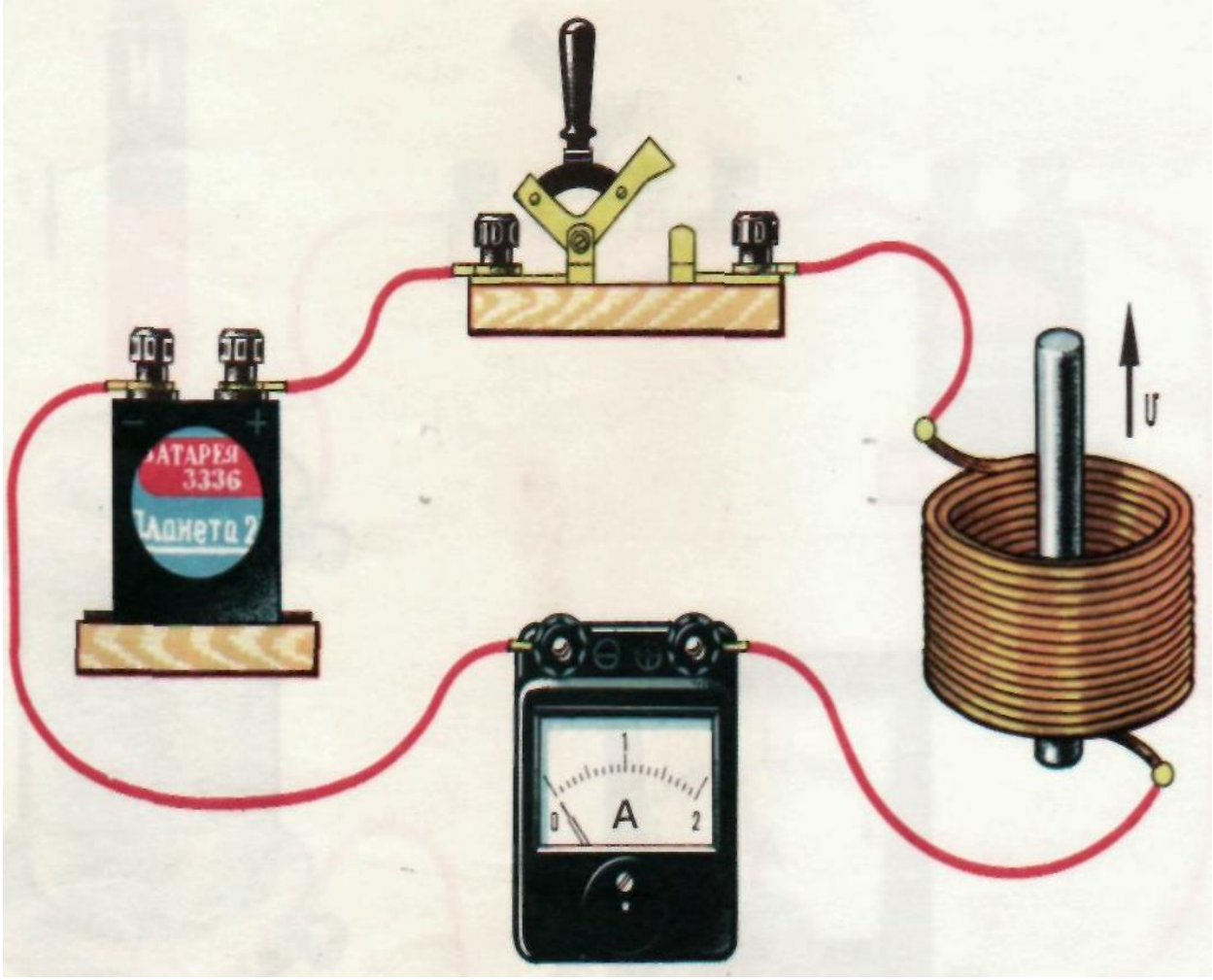
15-topshiriq



Rasmda induktivlik kalavasi qo‘shilgan elektr zanjir tasvirlangan. kalava o‘ramining yo‘nalishi uning yuzasida buyoq bilan shartli vintsimon chiziq bilan ko‘rsatilgan.

Magnit kalavaga kiritilganda zanjirdagi tok kuchining o‘zgarishi sifatli Yechimiini chizing va Yechimi shaklini tushuntiring.

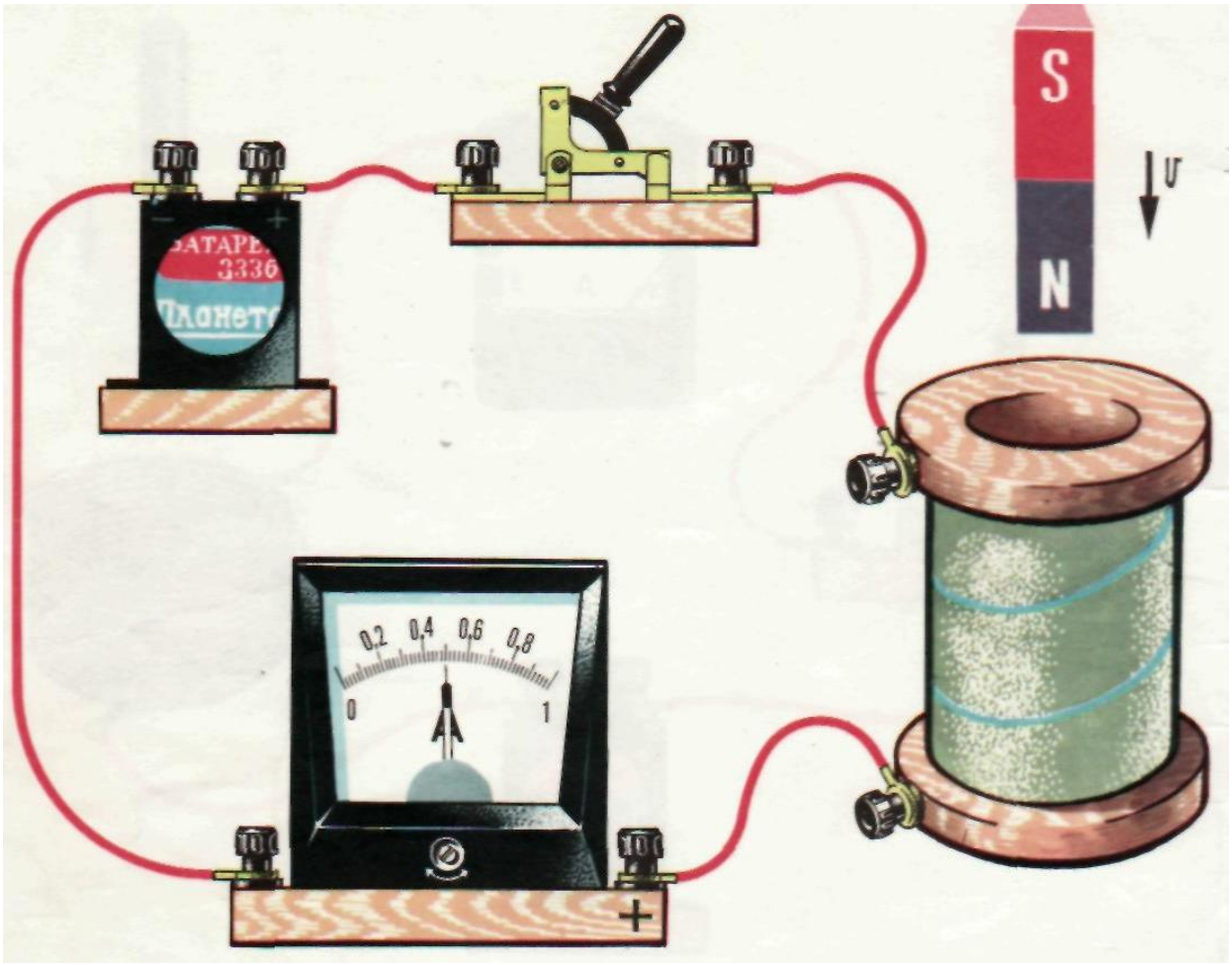
16-topshiriq



Rasmda katta miqdorli o‘ramli kalava va unga qo‘yilgan temir o‘zak qo‘shilgan uzilgan elektr zanjiri tasvirlangan.

Uni ulaganda va keyinchalik o‘zakni kalavadan chiqarganda zanjirdagi tok kuchi o‘zgarishining sifatli Yechimiini chizing. Yechimi shaklini tushuntiring.

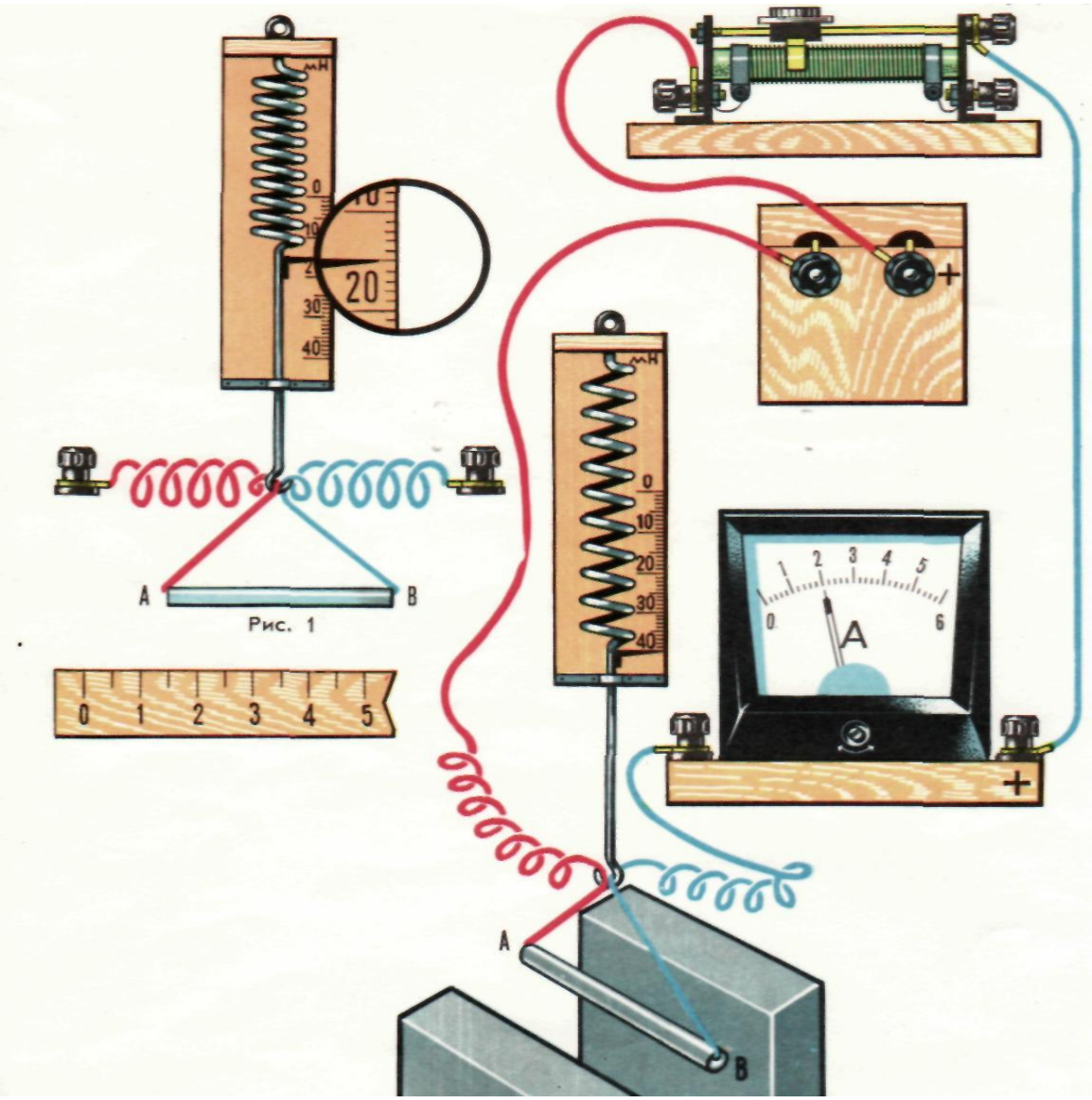
17-topshiriq



1. Rasmda induktivlik kalavasi qo‘shilgan elektr zanjir tasvirlangan. kalava o‘ramining yo‘nalishi uning yuzasida buyoq bilan shartli vintsimon chiziq bilan ko‘rsatilgan.

2. Magnit kalavaga kiritilganda zanjirdagi tok kuchining o‘zgarishi sifatli Yechimiini chizing va Yechimi shaklini tushuntiring.

18-topshiriq

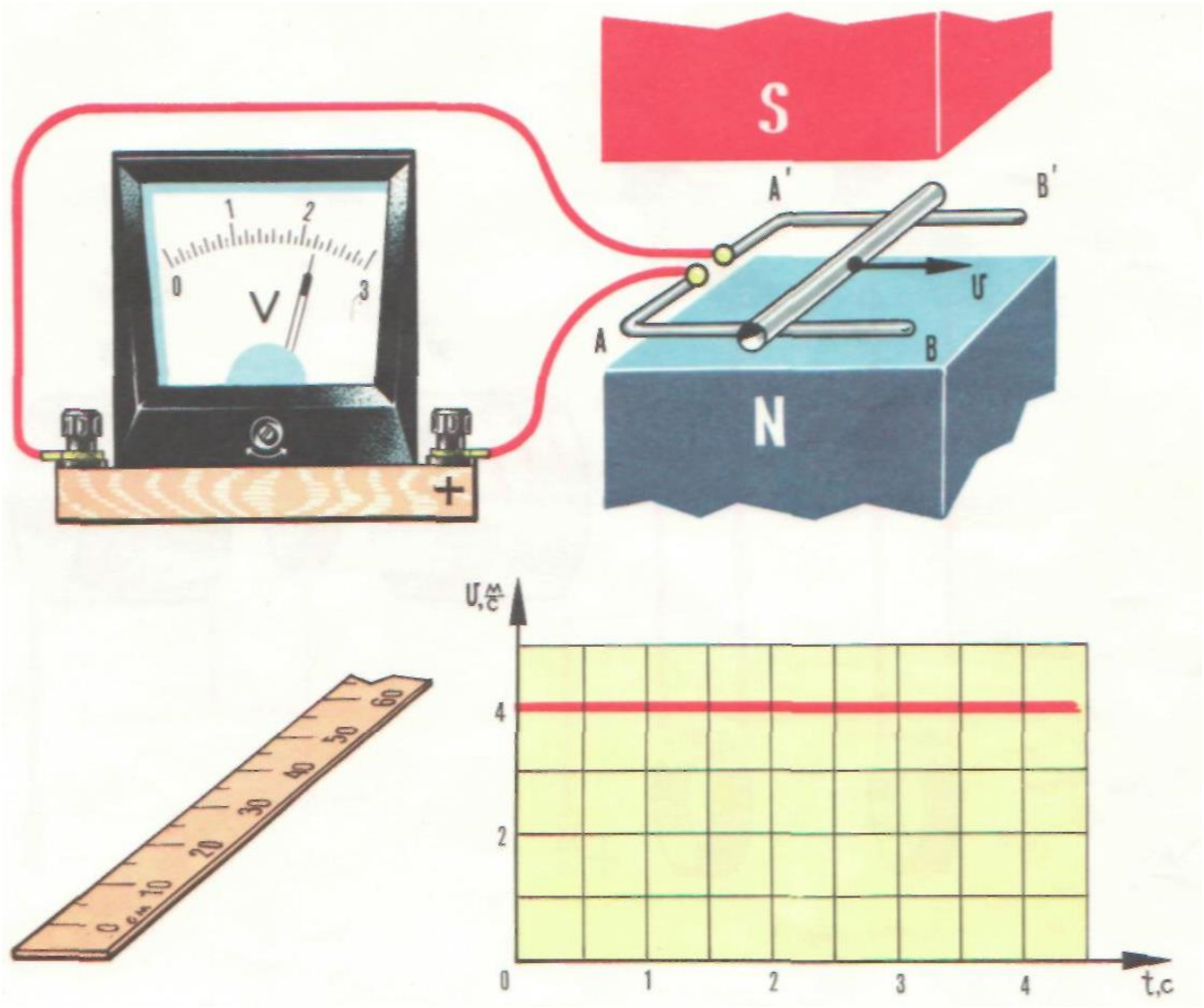


1 rasmda magnitelektrik asbobning o‘lchov mexanizmi ramkasi ko‘rsatilgan. Ramka ikkita yarim o‘q, spiralsimon prujinalar va strelka bilan to‘ldirilgan. Ramka o‘rami uchlari spiralsimon prujinalar orqali asbobning qisqichlari bilan biriktirilgan. Ramka buralganda prujinalar eshiladi i qarshi ta’sir etuvchi lahzani yaratadi M. Qarshi ta’sir etuvchi lahzaning burilish burchagidan bog‘liqligi Yechimida ko‘rsatilgan.

2 rasmda po‘lat tsilindr Ts va magnit qutblari orasida joylashgan ramka tok manbaiga ulangan.

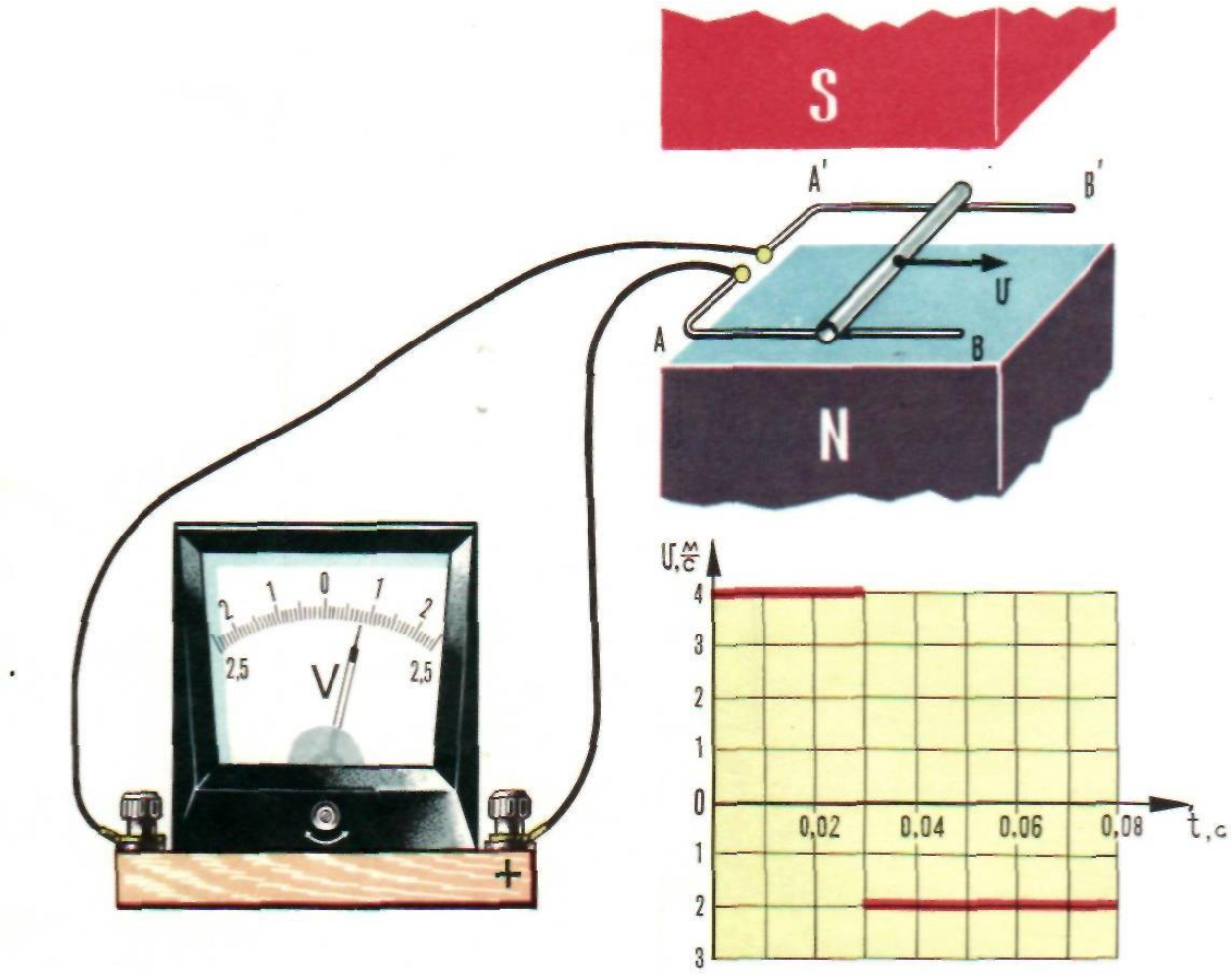
Magnit maydoni induktsiyasi ahamiyatini aniqlang va daftarda qutblar orasidagi magnit maydoni suratini chizing.

19-topshiriq



Magnitning yassi parallel qutblari orasida AV va A1V1 yo‘naltiruvchilar gorizontal holatda o‘rnatilgan. Yo‘naltiruvchilarda yengil metall naycha yotibdi. Dastlab naycha AA` nuqtalar bilan to‘g‘ri keladi, so‘ngra VV` nuqtalarga yetadi va yana dastlabki holatga qaytdi. Naycha harakati tavsifi Yechimida aks ettirilgan. Magnit maydoni induktsiyasi ahamiyatini aniqlang.

20-topshiriq

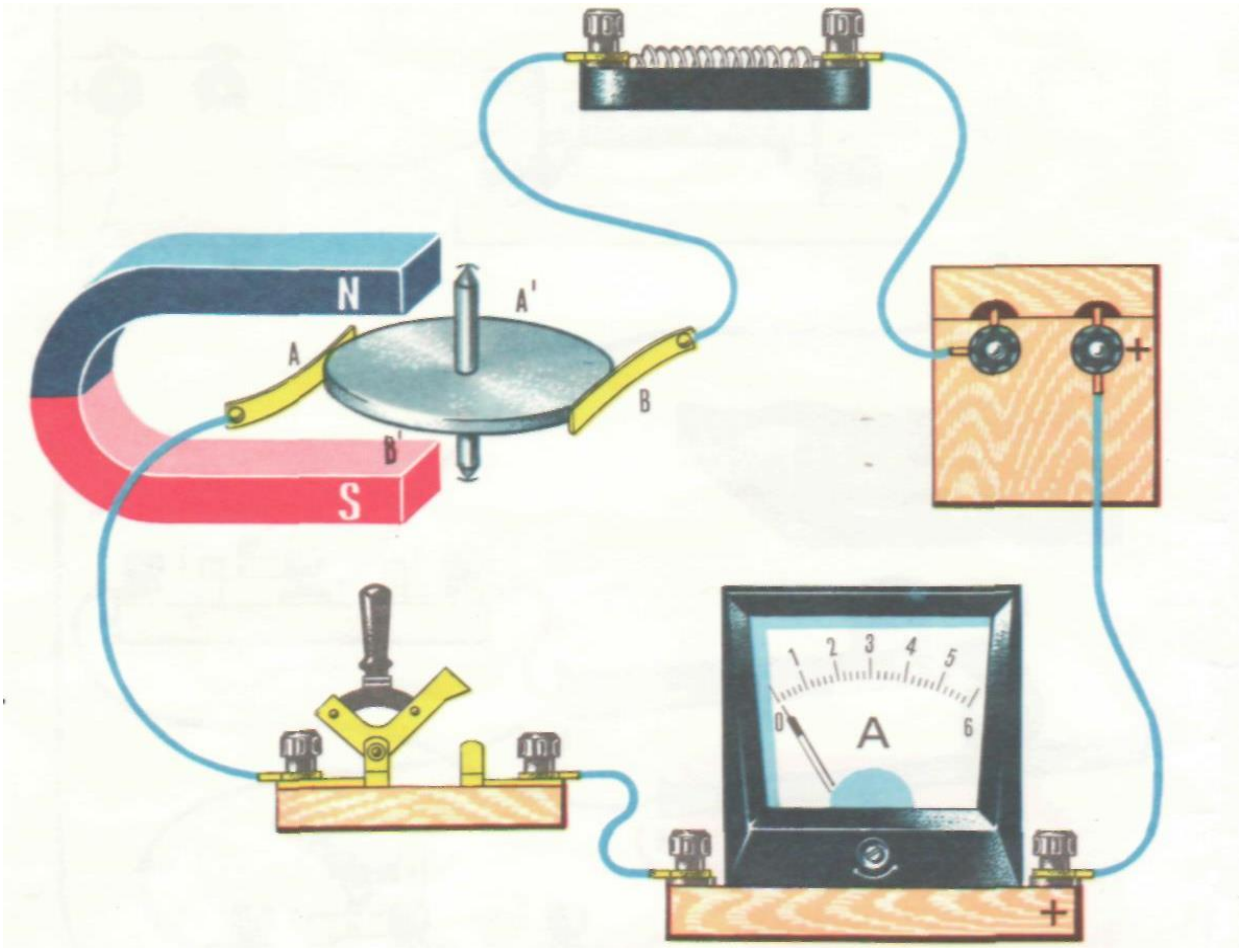


Magnit qutblari o‘rtasida ikkita gorizontal metall AV va A`B` yo‘naltiruvchilar o‘rnatilgan. Ushbu yo‘naltiruvchilarning (AA`) boshi elektrostatik voltmetr bilan qo‘shilgan.

Yo‘naltiruvchilar bo‘ylab yengil metall naycha sirg‘anmoqda. Dastlab naycha AA` nuqtalar bilan to‘g‘ri keladi, so‘ngra VV` nuqtalarga yetadi va yana dastlabki holatga qaytdi. Naycha harakati Yechimi rasmda ko‘rsatilgan.

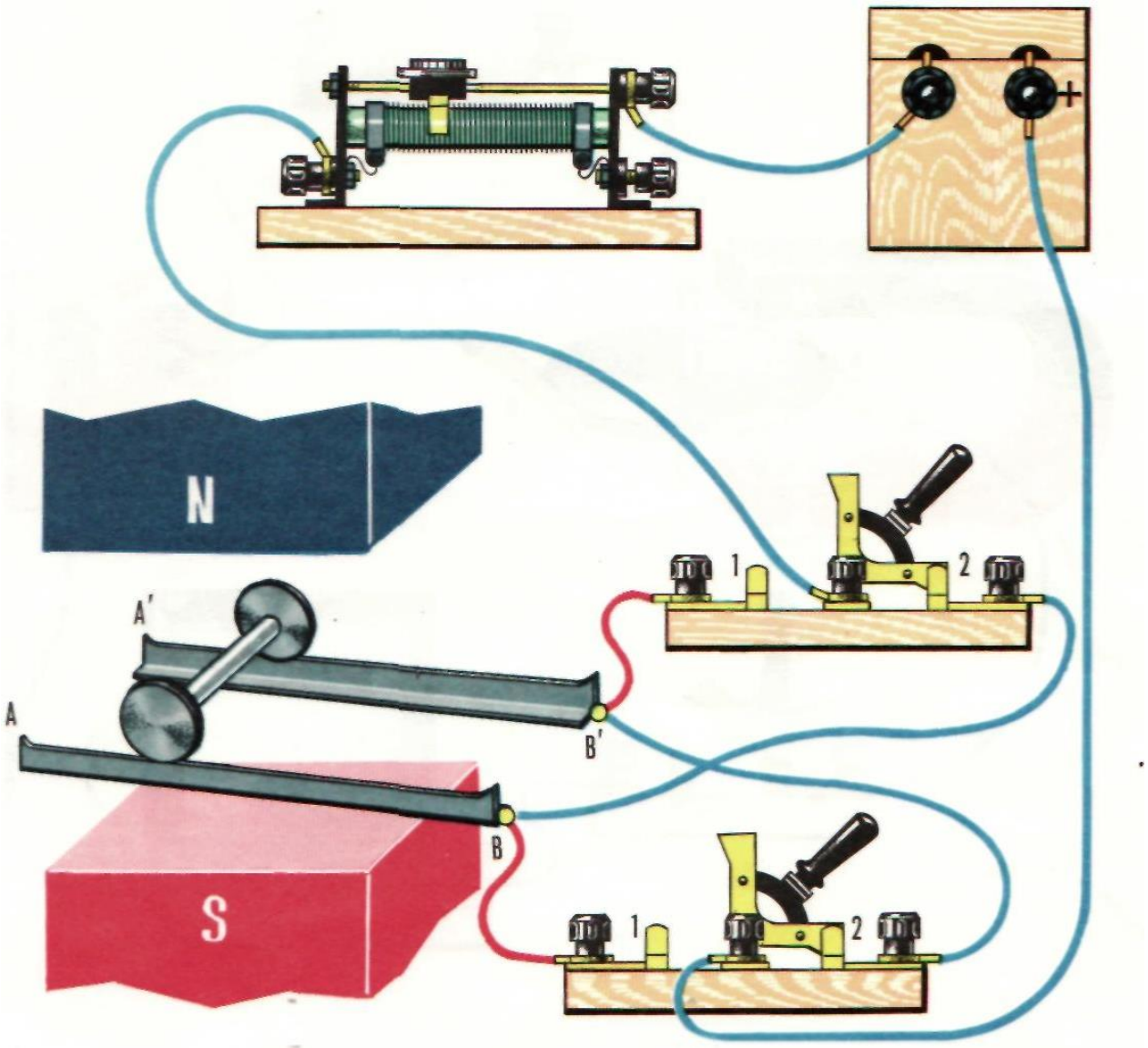
Naychaning harakati vaqti vazifasi sifatida yo‘naltiruvchilar va harakatchan naycha tashkil qilgan konturning ichidan o‘tuvchi (F) magnit oqim va EDS (Ɛi) Yechimini tuzing. Yechimlarini masshtabda tuzing.

21-topshiriq



Yoysimon magnitning magnit maydoni o‘qida mis disk o‘rnatilgan. Disk o‘qi juda ham kam ishqalanishli podshipniklarga tayanadi. A va V nuqtalarda diskka sirpanuvchi kontaktlar qo‘yilgan. Kalitni ulaganda disk aylanadimi va qaysi tomonga? Daftarda disk chizing va unda elektromagnit kuchi, tokning va magnit induktsiya vektori yo‘nalishini ko‘rsating. Agar A1 va V1 holatda cho‘tkalarni 900 burchakka burganda qanday o‘zgarishlar ro‘y beradi? Javobni asoslang.

22-topshiriq



Magnit qutblari orasida kichik nishabli ikkita rels (AV va A1V1) o‘rnatilgan. Relslarda metall g‘ildirakli juftlik joylashgan. Relslar tok manbai bilan ikkita tashlama kalit orqali ulangan. G‘ildirakli juftlikning kalitlar 2 kontaktlarga tutashganda va 1 kontaktlarga o‘tkazilgandagi mumkin bo‘lgan mexanik holatini tasvirlang.

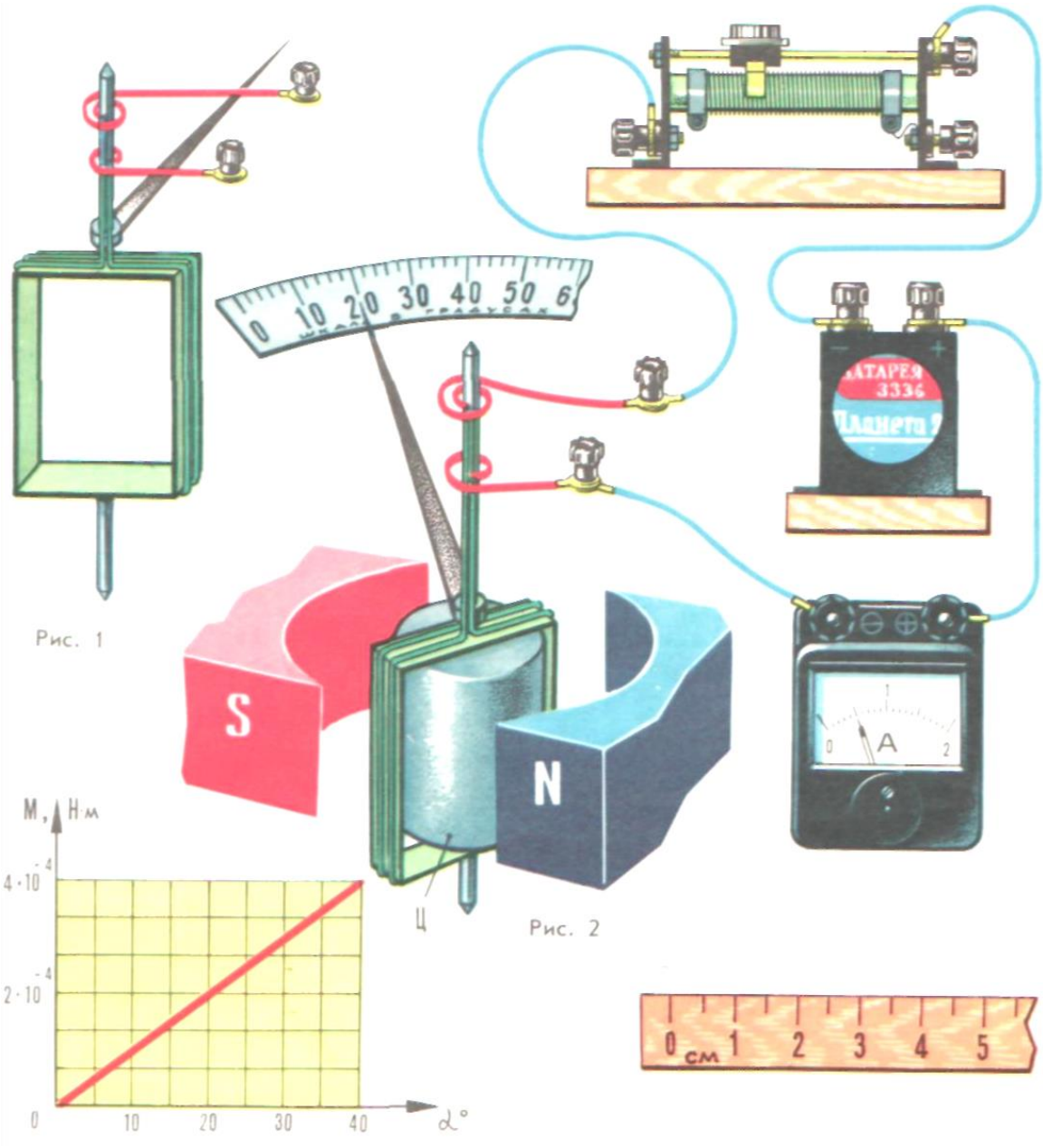


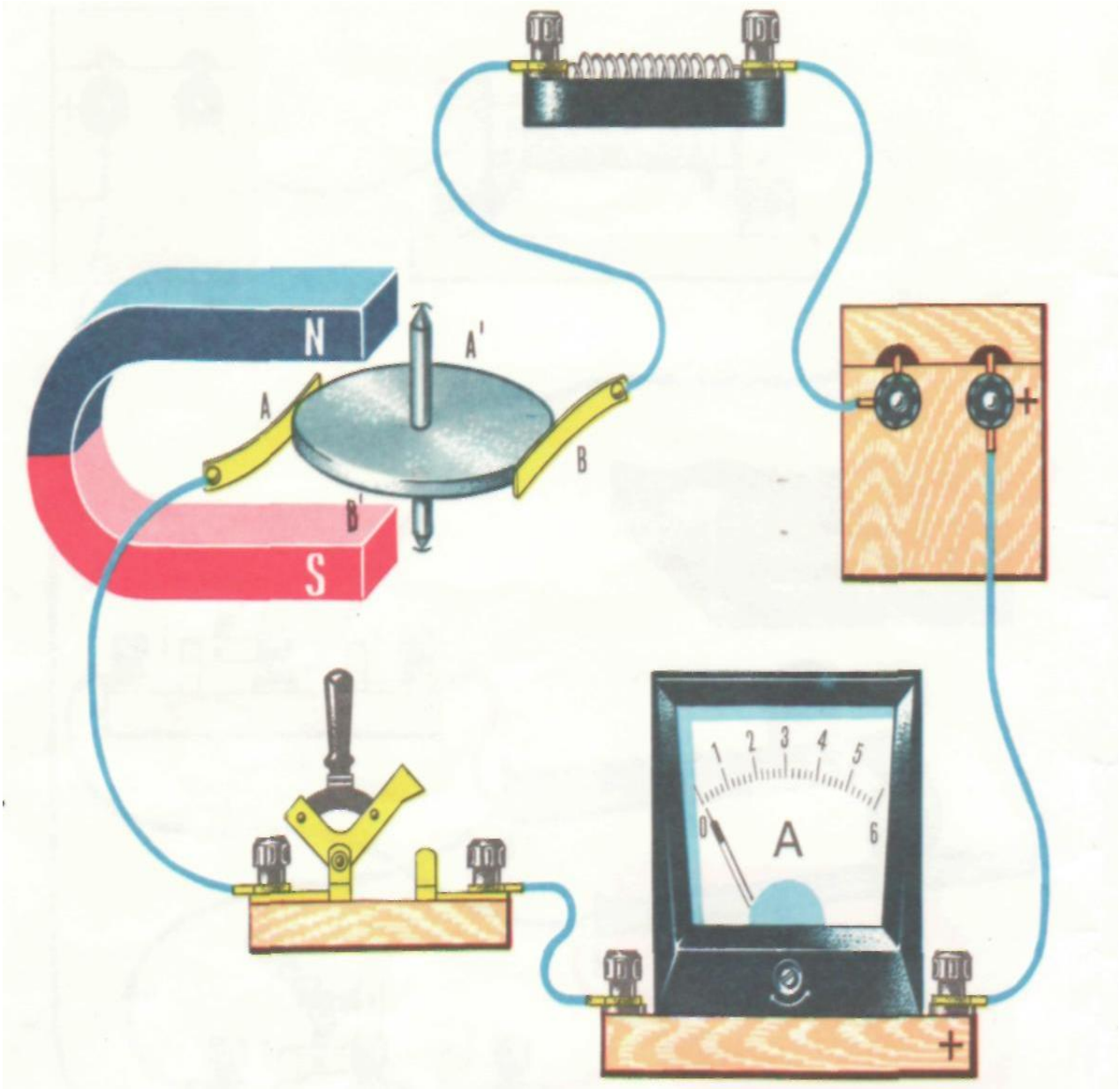
Рис. 1

Рис. 2

Ingichka izolyatsiyalangan o‘tkazuvchilar yordamida AV yengil alyumin naycha dinamometr ilgagiga osilgan va qisqichlar bilan biriktirilgan (1 rasm). So‘ngra naychani zanjirga ulashdi va magnitning qutblari orasiga joylashtirildi (2rasm).

Magnit maydoni induktsiyasini aniqlang. Magnitning yaqin yoki uzoq qutibi shimoliy?

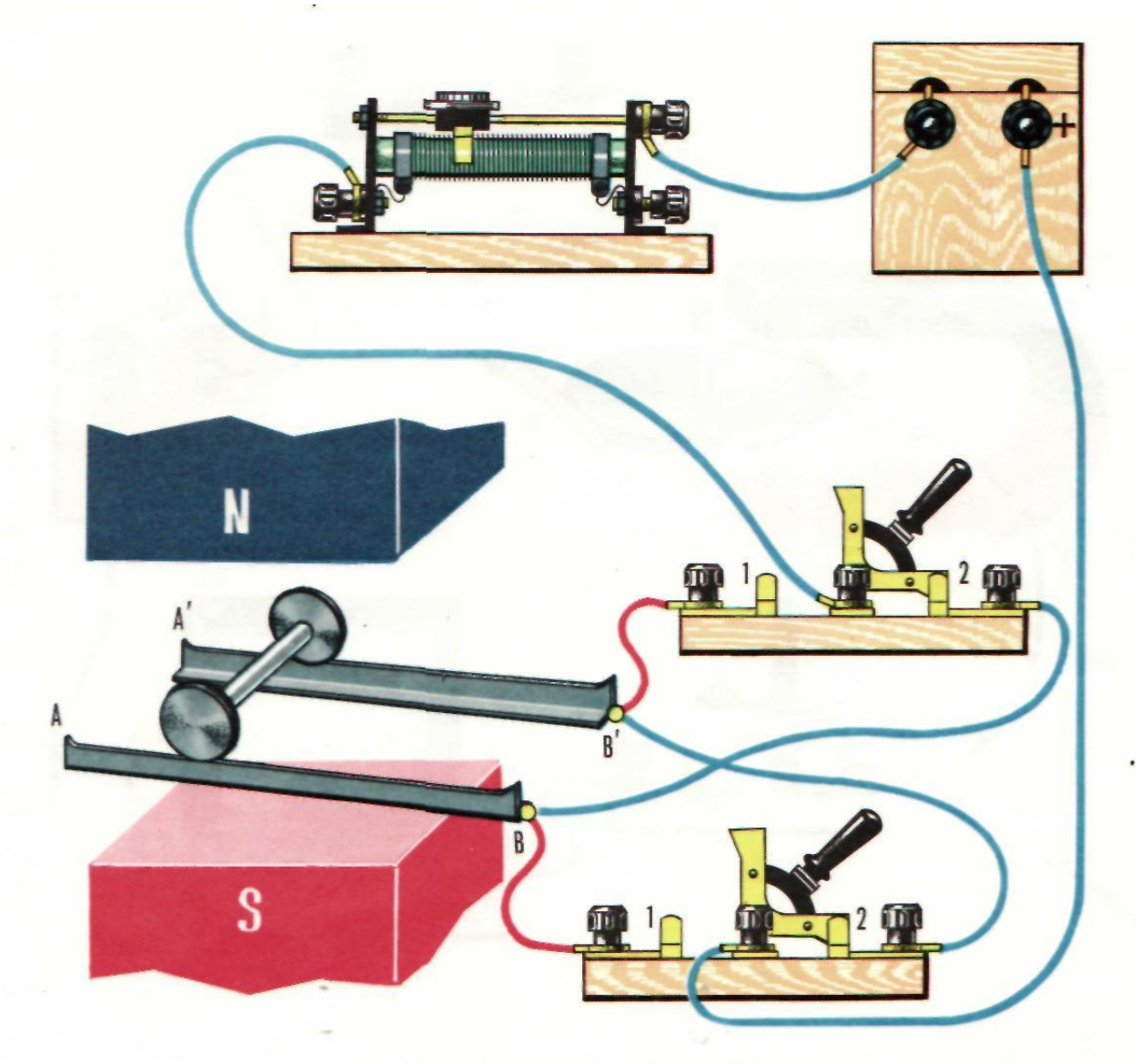
24-topshiriq



Magnitning qutblari orasida o‘qda disk o‘rnatilgan. Disk o‘qi juda ham kam ishqalanishli podshipniklarga tayanadi. A va V nuqtalarda diskka sirpanuvchi kontaktlar qo‘yilgan. Kalitni ulaganda disk aylanadimi va qaysi tomonga? Agar sirg‘aluvchi kontaktni V nuqtadan disk o‘qiga ko‘chirilsa nima o‘zgaradi?

Daftarlarda disk chizing va unda tokning, elektromagnit kuchi va magnit induktsiya vektori yo‘nalishi ko‘rsating.

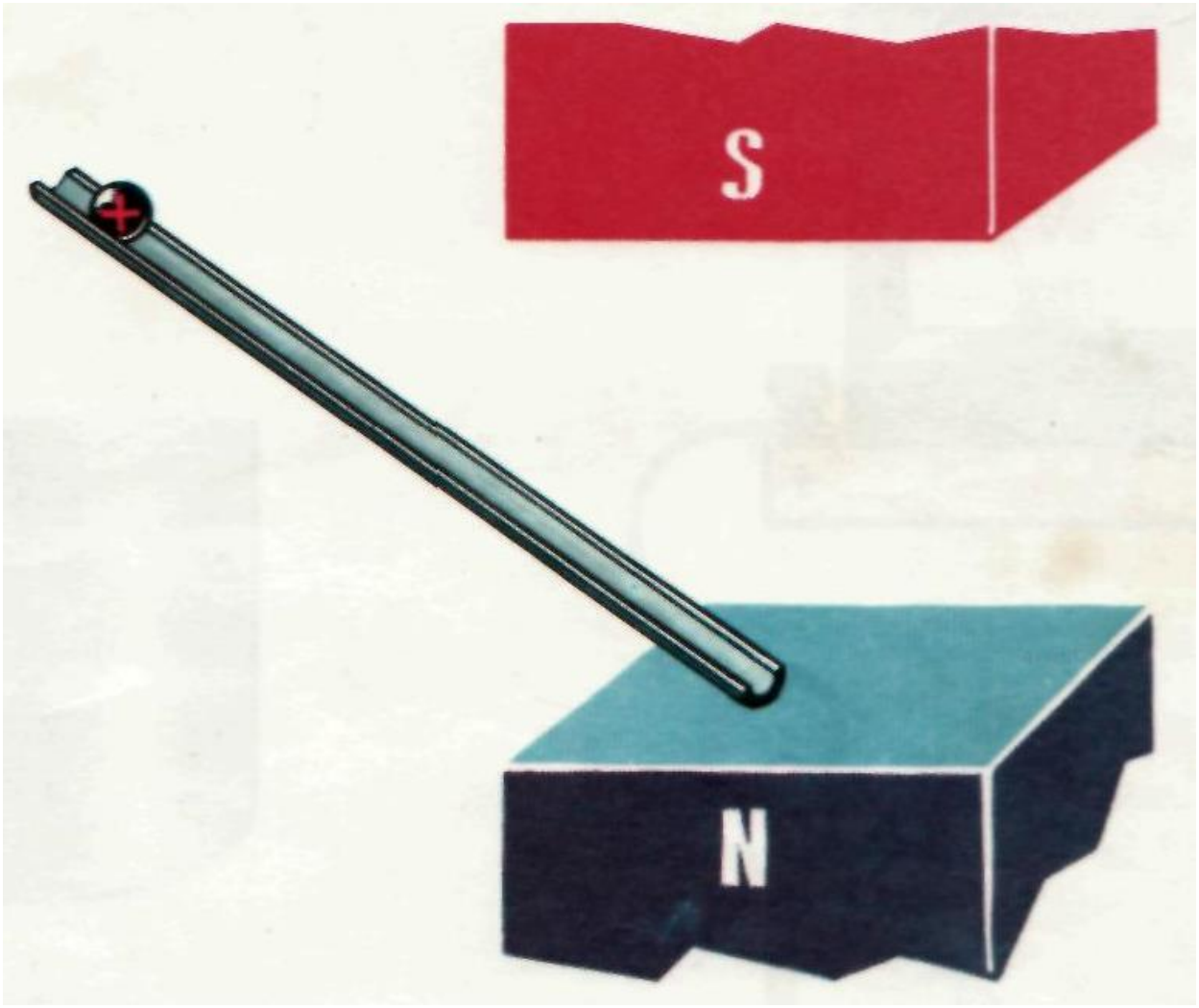
25-topshiriq



Magnit qutblari orasida ikkita gorizontal mis yo‘naltiruvchilar AV va A1V1 o‘rnatilgan. Yo‘naltiruvchilar tok manbai bilan ikkita tashlama kalit orqali ulangan.

Gorizontal yo‘naltiruvchilarda yengil metall naycha joylashgan. Naychaning kalitlar 2 kontaktlarga tutashganda va 1 kontaktlarga o‘tkazilgandagi mumkin bo‘lgan mexanik holatini tasvirlang.

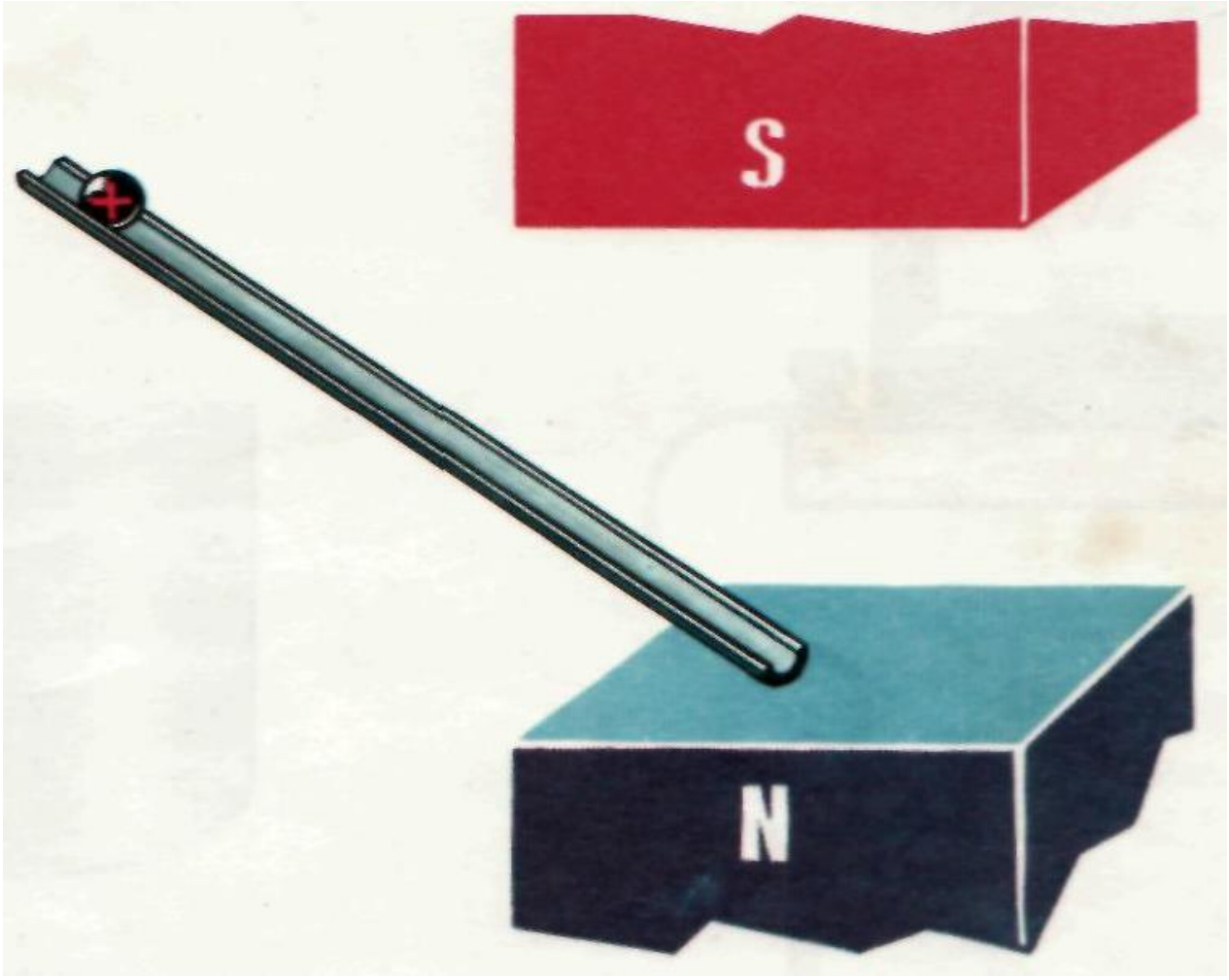
26-topshiriq



Musbat elektr zaryadli sharcha magnitning qutblari orasiga ipak ipda osilgan. Sharchani magnit qutb chegarasida og‘dirildi va qo‘yib yuborildi.

1. Sharchaning shimoliy magnit qutibi tekisligidagi harakati mumkin bo‘lgan traektoriyasini ishqalanish kuchini hisobga olmagan holda chizing.
2. Sharchaning shimoliy magnit qutibi tekisligidagi harakati mumkin bo‘lgan traektoriyasini sharcha tebranishida paydo bo‘luvchi ishqalanish kuchini hisobga olgan holda chizing.

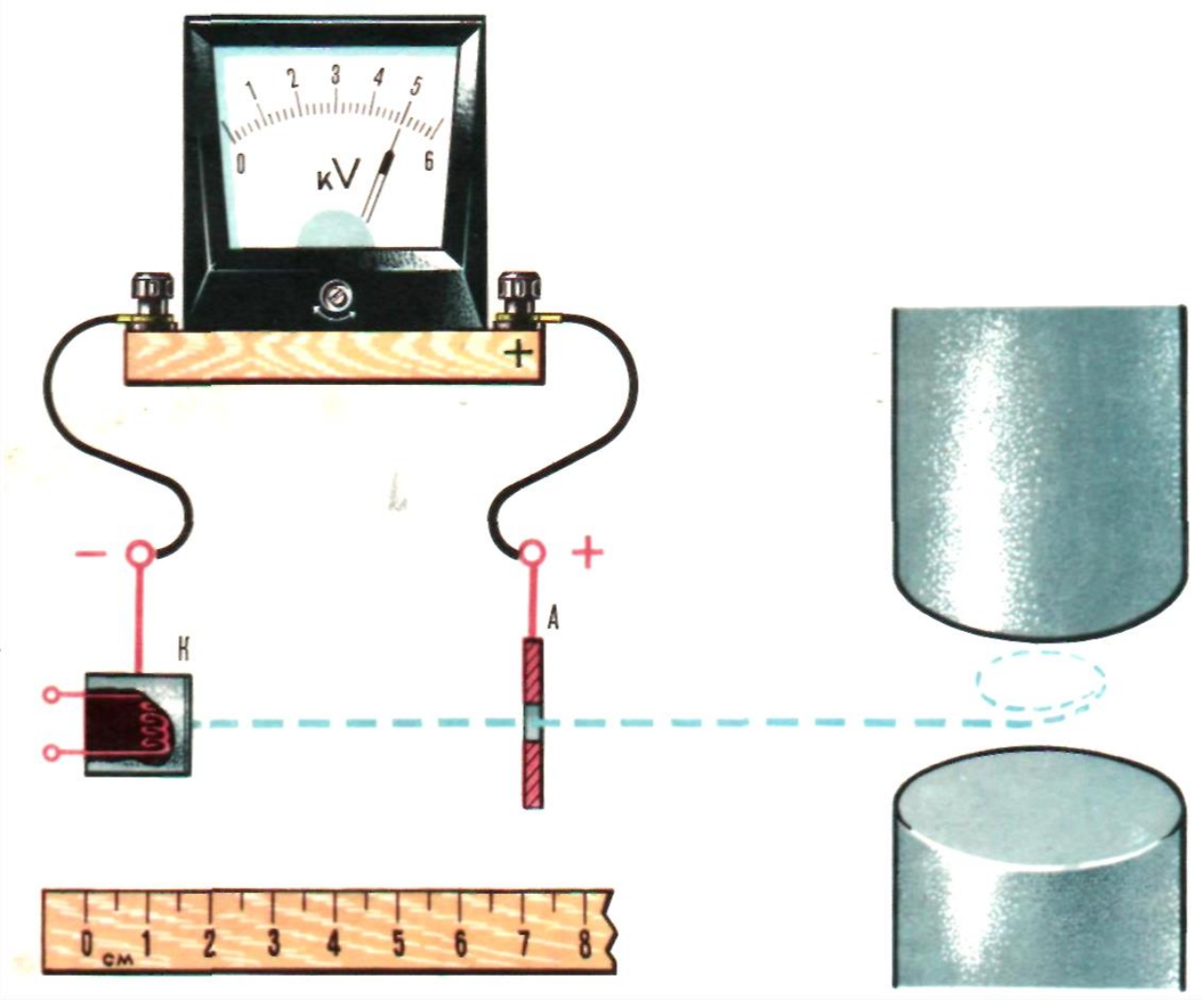
27-topshiriq



Magnit qutblari orasidagi bo‘shliqqa musbat elektr zaryadli sharcha yumalab tushmoqda. Qutblar sathi izolyatsion lok bilan qoplangan.

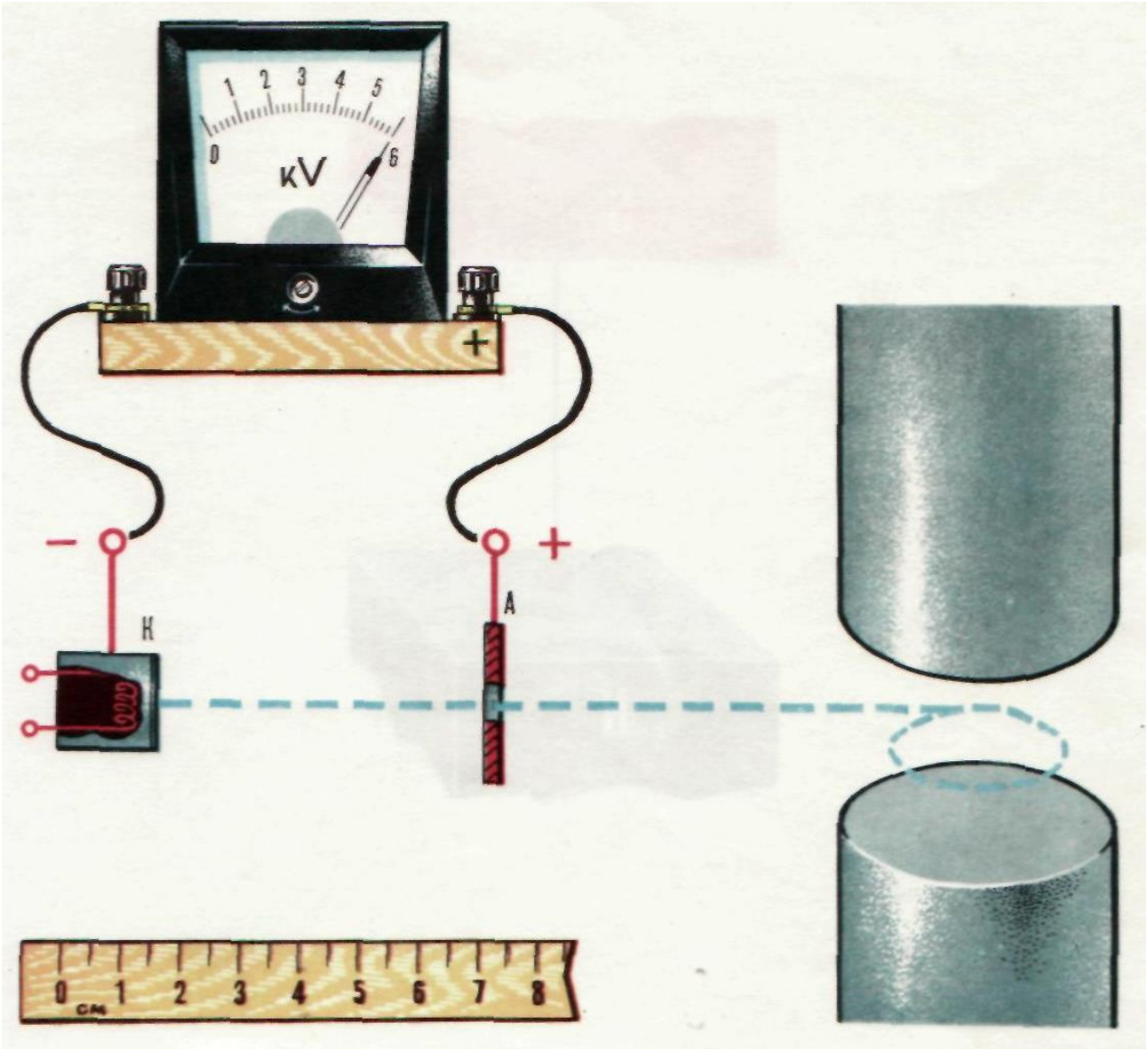
1. Sharchaning magnit qutblari chegaralarida mumkin bo‘lgan traektoriyasini ishqalanish kuchini hisobga olmagan holda chizing.
2. Sharchaning magnit qutibi tekisligidagi harakati mumkin bo‘lgan traektoriyasini sharcha tebranishida paydo bo‘luvchi ishqalanish kuchini hisobga olgan holda chizing.

28-topshiriq



1. Vakuumli kamerada elektron zambarak (K-katod, A-anod) va ikkita magnit qutb o‘rnatilgan. Katoddan uchib chiqayotgan elektronlar chiziqli liniya bilan ko‘rsatilgan traektoriya bo‘ylab harakatlanmoqda.
2. Magnit maydoni induktsiyasi va magnitning shimoliy qutb holati ahamiyatini aniqlang.
3. Elektronning traektoriya elementlari va tasvirlangan lineyka rasmda bir xil masshtabda tasvirlangan.

29-topshiriq

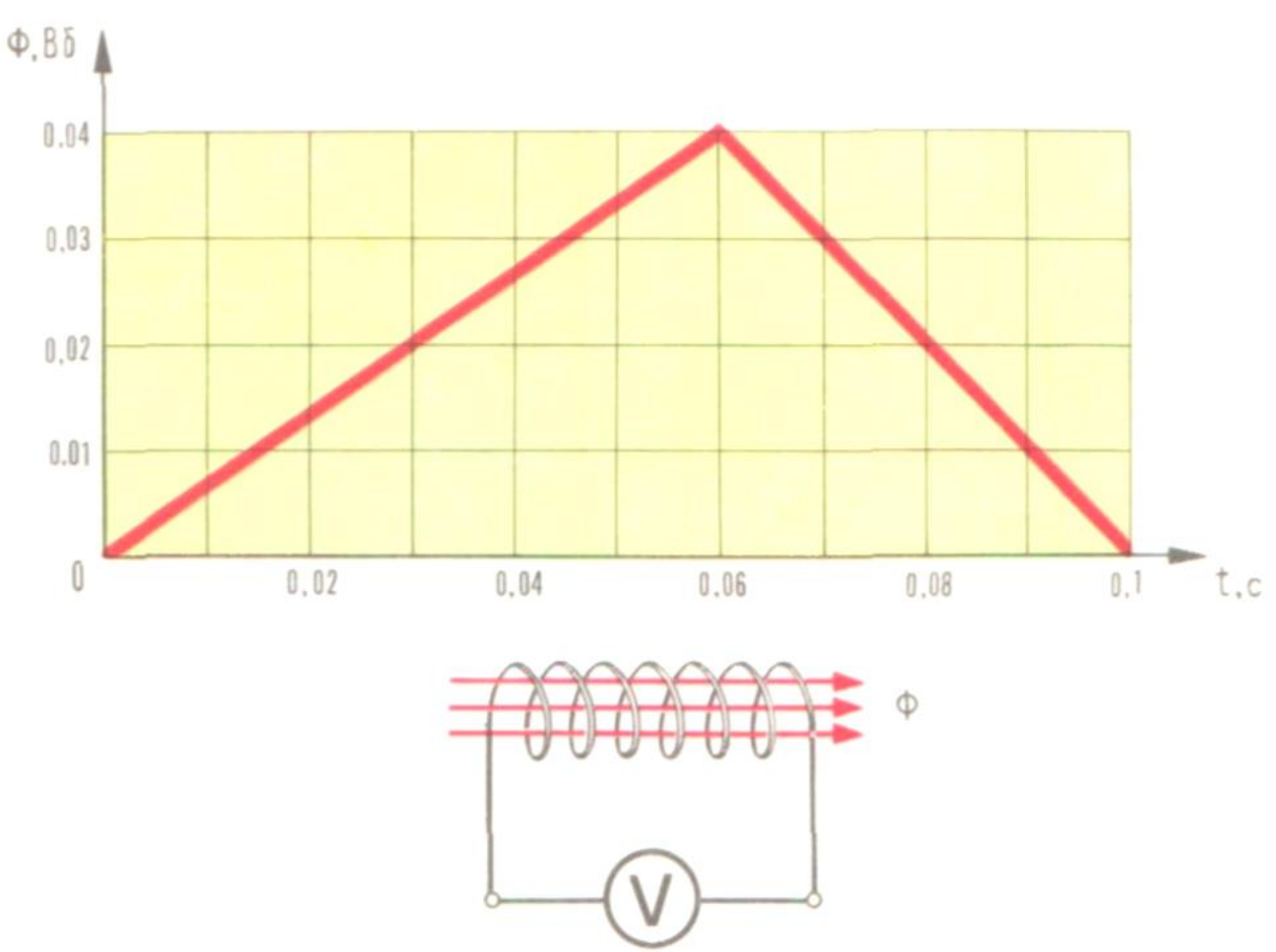


Vakuumli kamerada elektron zambarak (K-katod, A-anod) va ikkita magnit qutb o‘rnatilgan. Katoddan uchib chiqayotgan elektronlar chiziqli liniya bilan ko‘rsatilgan traektoriya bo‘ylab harakatlanmoqda.

Magnit maydoni induktsiyasi va magnitning shimoliy qutb holati ahamiyatini aniqlang.

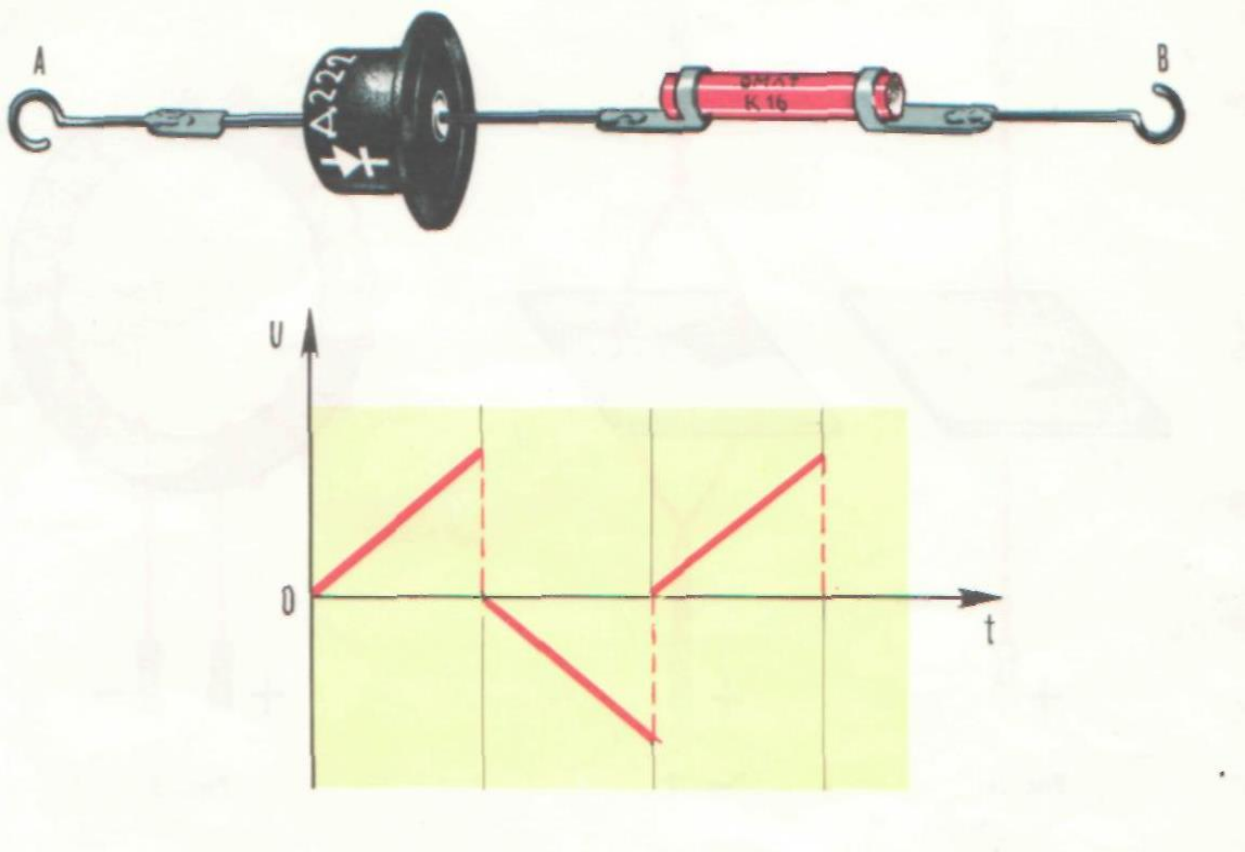
Izoh: Elektronning traektoriya elementlari va tasvirlangan lineyka rasmda bir xil masshtabda tasvirlangan.

30-topshiriq



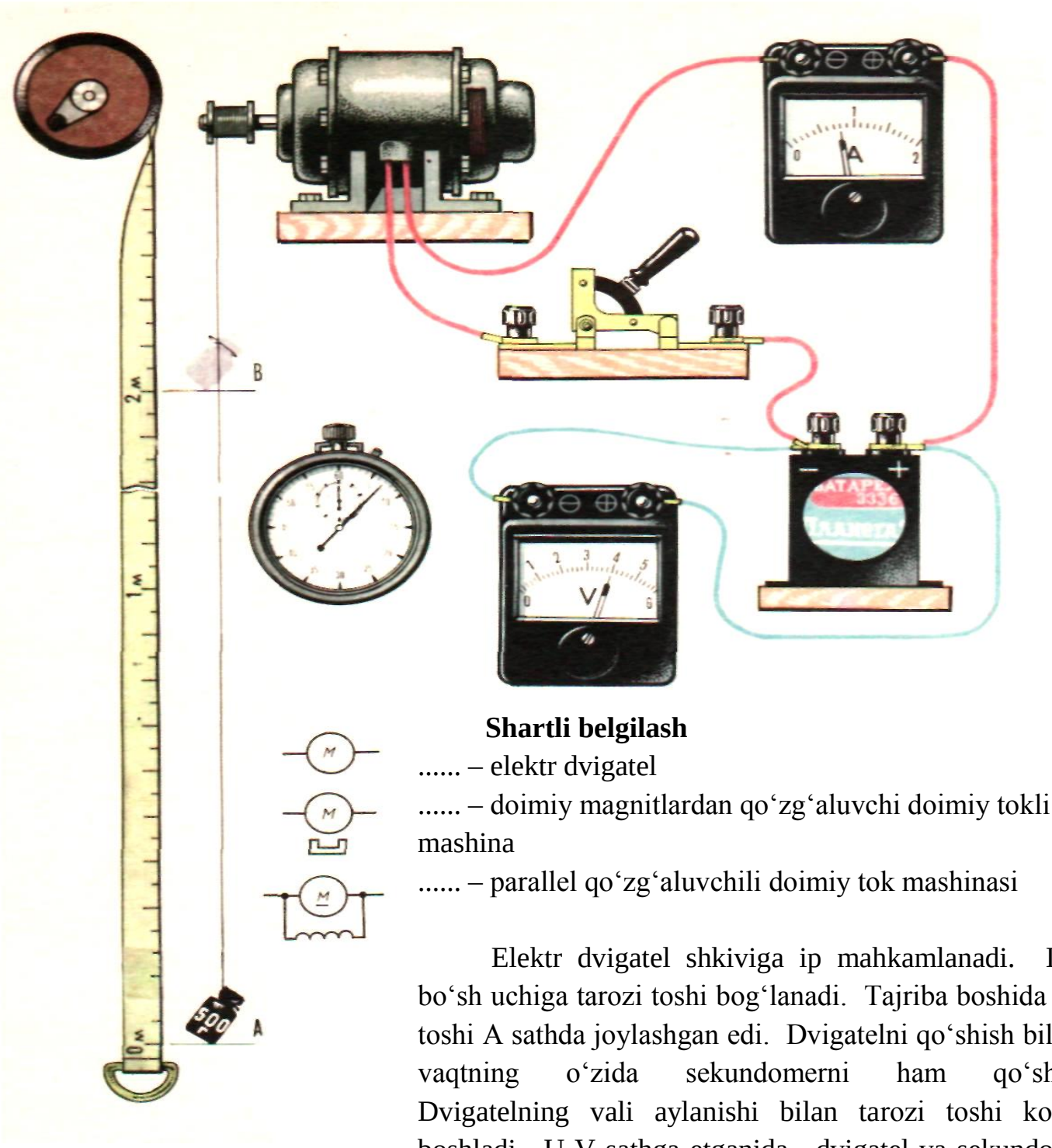
Kalava ichidan o‘tuvchi (F) magnit oqim (rasmga qarang), Yechimida ko‘rsatilganidek o‘zgaradi. Vaqt vazifasi (t) sifatida induklashgan kalavada EDS (Ɛi)ni Yechimini masshtabda tuzing.

31-topshiriq



Rasmda ko‘rsatilganidek elektr zanjir diod va rezistordan iborat. Zanjirning oxirida A va V nuqtalarida Yechimida xarakteri aks ettirilgan kuchlanish ilova qilingan. Zanjirda tok kuchining o‘zgarish Yechimiini (sifatli) tuzing.

32-topshiriq



Shartli belgilash

..... – elektr dvigatel

..... – doimiy magnitlardan qo‘zg‘aluvchi doimiy tokli mashina

..... – parallel qo‘zg‘aluvchili doimiy tok mashinasi

Elektr dvigatel shkiviga ip mahkamlanadi. Ipning bo‘sh uchiga tarozi toshi bog‘lanadi. Tajriba boshida tarozi toshi A sathda joylashgan edi. Dvigatelni qo‘shish bilan bir vaqtning o‘zida sekundomerni ham qo‘shishdi. Dvigatelning vali aylanishi bilan tarozi toshi ko‘tarila boshladi. U V sathga etganida, dvigatel va sekundomerni bir vaqtda to‘xtatishdi.

1. Elektr dvigatel quvvatini (R) aniqlang.
2. Dvigatel foydalangan quvvat miqdorini (A3) hisoblang.
3. Dvigatel bajargan fodali ishni (Af) toping.
4. Dvigatel FHKni hisoblang.
5. Dvigatel ishlaganda qancha miqdorda issiqlik (Q) ajraldi.
6. Elektr dvigateldagi yo‘qotishlar (R1) quvvatini hisoblang.
7. Tasvirlangan uskuna elektr zanjirining printsipial sxemasini chizing.

FOYDALANILGAN ADABIYOTLAR

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O`quv-uslubiy nashr

Nashriyot muharriri: Mirzayev Bekzod
Mycaxxux: Rajabov Orifjon
Texnik muharrir:

***Nashriyot* litsenziyasi:**
_____

Terishga berildi: 07.11.2017. Bosishga ruxsat etildi:_____
Bichimi _____.Times New Roman garniturasi.
Bosma tabog`i: 6,00. Adadi: _____
Bahosi kelishilgan narxda.

***Nashriyot* manzili:**
«» *nashriyoti*,_____, ____
_____

Bosmaxona manzili:
«» MCHJda chop etildi.
_____