PRIPREMA ZA ISPIT ZNANJA - EL. STRUJNI KRUG, 2. dio

1. $Q = 30C$, $W = 900J$, $U = ?$

$U = \frac{W}{Q}$

$U = \frac{900J}{30C}$

$\boxed{U = 30V}$

2. $U = 6V$, $W = 3600J$, $Q = ?$

$U = \frac{W}{Q}$ $\quad Q = \frac{3600J}{6V}$

$Q = \frac{W}{U}$ $\quad \boxed{Q = 600C}$

3. $U = 220V$, $Q = 3C$, $W = ?$

$U = \frac{W}{Q}$ $\quad W = 220V \cdot 3C$

$W = U \cdot Q$ $\quad \boxed{W = 660J}$

4. $U = 4.5V$, $I = 0.3A$, $W = \Delta E = 0.0135kJ = 13.5J$, $t = ?$

$W = U \cdot I \cdot t \quad / : UI$

$t = \frac{W}{UI}$ $\quad t = \frac{13.5J}{4.5V \cdot 0.3A}$

$\boxed{t} = \frac{13.5J}{1.35VA} = \boxed{10s}$

$\boxed{t = 10s}$

5. a) $U = 9V$, $U_1 = U_2 = U_3 = ?$ — 3 jednake žarulje serijski spoj

$U = U_1 + U_2 + U_3 = 3U_1$

$9V = 3U_1 \quad / : 3$

$3V = U_1$

$\boxed{U_1 = U_2 = U_3 = 3V}$

5. b) $U = 4,5V + 4,5V = 9V$ serijski spoj izvora

$U_1 = U_2 = U_3 = U = 9V$

3 jednake žarulje, paralelan spoj

5. c) $U = 9V$, $U_1 = U_2 = ?$, $U_3 = ?$

$U = U_1 + U_2$ ista grana paralelnog spoja

$U_1 = U_2$ jednake žarulje spojene serijski

$9V = U_1 + U_1$

$9V = 2U_1 \quad / : 2$

$4.5V = U_1$

$\boxed{U_1 = U_2 = 4.5V}$

$\boxed{U_3 = U = 9V}$ 3. žarulja je u posebnoj grani paralelnog spoja

6. a) $U_{AB} = 12V$

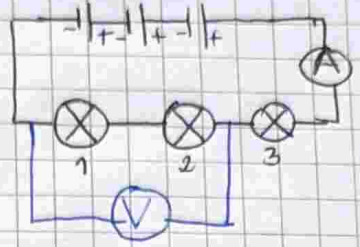
b) $U_{AB} = \frac{U}{3} = \frac{12V}{3} = 4V$

c) $U_{AB} = 12V$

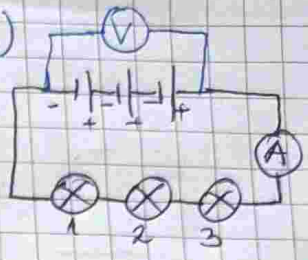
7. a) mjeri napon na krajevima žarulja (1) i (2)

b) mjeri napon izvora

a)



b)



8. a) $U = 9V$, $U_1 = 3V$, $U_2 = ?$

$U = U_1 + U_2$

$U_2 = U - U_1$

$U_2 = 9V - 3V$

$\boxed{U_2 = 6V}$

b) $Q = 1C$, $U = 9V$, $\Delta E = ?$

$\Delta E = W$

$U = \frac{W}{Q}$

$W = U \cdot Q$

$W = 9V \cdot 1C$

$\boxed{W = 9J}$

c) $U_A = 3V$, $Q = 1C$, $W = ?$

$W = \Delta E$

$W = U_A \cdot Q$

$W = 3V \cdot 1C$

$\boxed{W = 3J}$

9. $I = 60A$, $U = 230V$, $P = ?$

$P = UI$

$P = 230V \cdot 60A$

$P = 13800W$

10. $t = 8h$, $U = 220V$, $I = 5,5A$, $\Delta E = ?$

$\Delta E = W$

$W = UIt$

$W = 220V \cdot 5.5A \cdot 8h$

$W = 1210W \cdot 8h$

$W = 9680Wh$

$W = 9.68kWh$

ili

$W = 220V \cdot 5.5A \cdot 28800s$

$W = 34848000J$

11. $P = 1.4kW$, $t = 1h$, $W = ?$

$P = \frac{W}{t}$

$W = P \cdot t$

$W = 1.4kW \cdot 1h$

$W = 1.4kWh$

12. $P = 1,2kW = 1200W$, $U = 220V$

a) $I = ?$

$P = UI$

$I = \frac{P}{U}$

$I = 1200W : 220V$

$\boxed{I = 5.45A}$

b) $t = 4h$, $W = ?$

$W = UIt$

$W = 220V \cdot 5.54A \cdot 4h$

$W = 4796Wh = 4.796kWh$

13. $I = 2.5A$
$P = 275W$
$U = ?$

$P = UI$

$275W = U \cdot 2.5A \quad | :2.5A$

$U = \frac{275W}{2.5A}$

$\boxed{U = 110V}$

14. $P = 500W$
$W = 6kJ = 6000J$
$t = ?$

$P = \frac{W}{t}$

$t = \frac{W}{P}$

$t = \frac{6000J}{500W}$

$\boxed{t = 12s}$

15. $U = 220V$
$t = 1h$
$Q = 900C$
$P = ?$

$I = \frac{Q}{t}$

$I = \frac{900C}{3600s}$

$I = 0.25A$

$P = UI$

$P = 220V \cdot 0.25A$

$\boxed{P = 55W}$

16. $t = 14 \text{ dana} = 336h$
$P = 100W$
cijena $0.4 kn/kWh$
cijena?

$P = \frac{W}{t}$

$W = P \cdot t$

$W = 100W \cdot 336h$

$W = 33600Wh$

$W = 33,6 kWh$

cijena (ukupno) $= 33,6kWh \cdot 0.4 kn/kWh$

$= \boxed{13,44 kn}$

Platit ćemo 13,44 kune.

17. $R = 2k\Omega = 2000\Omega$
$U = 220V$
$I = ?$

$I = \frac{U}{R}$

$\boxed{I = \frac{220V}{2000\Omega}} = \boxed{0.11A}$

$\boxed{I = 0.11mA}$

18. $R = 50\Omega$
$I = 0.2A$
$U = ?$

$I = \frac{U}{R}$

$U = I R$

$U = 0.2A \cdot 50\Omega$

$\boxed{U = 10V}$

19. $R = 40\Omega$
$I = 25mA = 0.025A$
$U = ?$

$I = \frac{U}{R}$

$U = I \cdot R$

$U = 0.025A \cdot 40\Omega$

$\boxed{U = 1V}$

20. $U = 220V$
$I = 2A$
$R = ?$

$I = \frac{U}{R}$

$R = \frac{U}{I}$

$R = \frac{220V}{2A}$

$R = 110\Omega$

21. $R = 3\Omega$
$t = 2min = 120s$
$U = 4.5V$
$Q = ?$

$I = \frac{U}{R}$

$I = \frac{4.5V}{3\Omega}$

$I = 1.5A$

$I = \frac{Q}{t}$

$Q = I \cdot t$

$Q = 1,5A \cdot 120s$

$\boxed{Q = 180C}$

22. $U = 220V$
$t = 3\,min = 180\,s$
$Q = 3600\,C$
$R = ?$

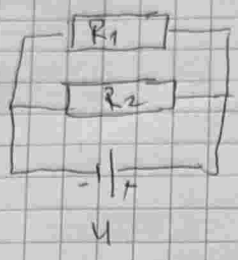
$I = \frac{Q}{t}$ $\quad R = \frac{U}{I}$

$I = \frac{3600\,C}{180\,s}$ $\quad R = \frac{220V}{20A}$

$I = 20A$ $\quad \boxed{R = 11\,\Omega}$

23. $R_1 = 2\,\Omega$
$R_2 = 8\,\Omega$
paralelan spoj
$R = ?$

a)



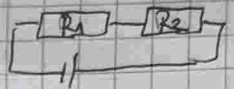
$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

$\frac{1}{R} = \frac{1}{2\,\Omega} + \frac{1}{8\,\Omega}$

$\frac{1}{R} = \frac{4+1}{8\,\Omega} = \frac{5}{8\,\Omega}$

$R = \frac{8\,\Omega}{5} = 1.6\,\Omega$

24. $R_1 = 7\,\Omega$
$R_2 = 5\,\Omega$
serijski spoj



$R = R_1 + R_2$

$R = 7\,\Omega + 5\,\Omega$

$\boxed{R = 12\,\Omega}$

25.
a) $R_{uk} - R = 2\,\Omega$

b) $R_{uk} = 2R = 4\,\Omega$

c) $\frac{1}{R_{uk}} = \frac{1}{R} + \frac{1}{2}$

$\frac{1}{R_{uk}} = \frac{2}{R}$

$R_{uk} = \frac{R}{2}$ $\quad \boxed{R_{uk} - \frac{R}{2} = 1\,\Omega}$

U c) najveća struja jer je otpor najmanji;

a i b) najmanja je otpor najveći

VEĆI OTPOR → MANJA STRUJA.

26. $R_1 = 4\,\Omega$
a) $R_2 = 2\,\Omega$
$R_3 = 2\,\Omega$
$R = ?$

$\frac{1}{R_{23}} = \frac{1}{R_2} + \frac{1}{R_3}$

$\frac{1}{R_{23}} = \frac{1}{2\,\Omega} + \frac{1}{2\,\Omega} = \frac{2}{2\,\Omega}$

$R_{23} = \frac{2\,\Omega}{2} = 1\,\Omega$

$R = R_1 + R_{23}$

$\boxed{R = 4\,\Omega + 1\,\Omega = 5\,\Omega}$

26. b) $R_1 = 4\,\Omega$
$R_2 = 4\,\Omega$
$R_3 = 2\,\Omega$
$R = ?$

$R_{1,2} = R_1 + R_2$

$R_{1,2} = 4\,\Omega + 4\,\Omega$

$\boxed{R_{1,2} = 8\,\Omega}$

$\frac{1}{R} = \frac{1}{R_{1,2}} + \frac{1}{R_3}$

$\frac{1}{R} = \frac{1}{8\,\Omega} + \frac{1}{2\,\Omega}$

$\frac{1}{R} = \frac{1+4}{8\,\Omega} = \frac{5}{8\,\Omega}$

$\boxed{R = \frac{8\,\Omega}{5} = 1.6\,\Omega}$

27.
a) $I = 2A$

b) $I = 2A$, $U = 8V$
$R = ?$

$R = \frac{U}{I}$

$R = \frac{8V}{2A} = 4\,\Omega$

c) $R = 4\,\Omega$
$U = 16V$
$I = ?$

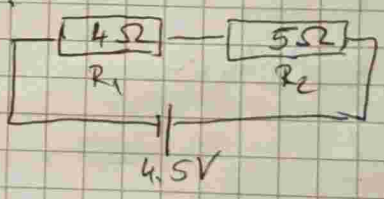
$I = \frac{U}{R}$

$I = \frac{16V}{4\,\Omega}$

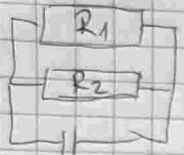
$\boxed{I = 4A}$

ili napon 2x veći, struja 2x veća.

28. $R_1 = 4\,\Omega$, $R_2 = 5\,\Omega$ shema?
$U = 4.5V$



29. $R_1 = 25\,\Omega$
$R_2 = 100\,\Omega$
$U = 220\,V$
paralelna spoj
$I = ?$



$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

$\frac{1}{R} = \frac{1}{25\,\Omega} + \frac{1}{100\,\Omega}$

$\frac{1}{R} = \frac{4+1}{100\,\Omega} = \frac{5}{100\,\Omega}$

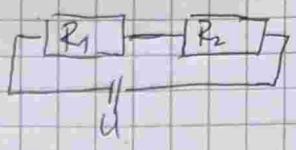
$R = \frac{100\,\Omega}{5} = 20\,\Omega$

$I = \frac{U}{R}$

$I = \frac{220\,V}{20\,\Omega}$

$\boxed{I = 11\,A}$

30. $R_1 = 6\,\Omega$
$R_2 = 4\,\Omega$
$U = 20\,V$



a) $R = ?$

$R = R_1 + R_2$

$R = 6\,\Omega + 4\,\Omega$

$\boxed{R = 10\,\Omega}$

b) $I = \frac{U}{R}$

$I = \frac{20\,V}{10\,\Omega}$

$\boxed{I = 2\,A}$

c) $U_1 = ?$
$U_2 = ?$

$I_1 = \frac{U_1}{R_1}$

$U_1 = I_1 R_1$

$I = I_1 = 2\,A$

$U_1 = 2\,A \cdot 6\,\Omega$

$\boxed{U_1 = 12\,V}$

$I = I_2 = 2\,A$

$U_2 = I_2 R_2$

$U_2 = 2\,A \cdot 4\,\Omega$

$\boxed{U_2 = 8\,V}$

31. $t = 2\,s$
$Q = 4\,C$
$I = ?$

$I = \frac{Q}{t}$

$I = \frac{4\,C}{2\,s}$

$\boxed{I = 2\,A}$

32. $Q = 1\,C$
$I = 0.04\,A$
$t = ?$

$I = \frac{Q}{t}$

$t = \frac{Q}{I}$

$t = \frac{1\,C}{0.04\,A}$

$\boxed{t = 25\,s}$

33. $t = 1\,min = 60\,s$
$I = 0.6\,A$
$Q = ?$

$Q = I \cdot t$

$Q = 0.6\,A \cdot 60\,s$

$\boxed{Q = 36\,C}$

34. $t = 2\,min$
$Q_1 = 4200\,C$
$Q_2 = 50\,C$

Prvim vodičem teče jača struja je kroz poprečni presjek vodiča protekne veća količina naboja.

35. $t = 1\,h = 3600\,s$
$I = 5\,A$
$Q = ?$

$Q = I t$

$Q = 5\,A \cdot 3600\,s$

$Q = 18000\,C$

Zadatak 1

a) $I = 0.3\,A$

b) $I_2 = 0.5\,A - 0.2\,A$
$I_2 = 0.3\,A$

c) $I = I_1 + I_2$
$I = 0.1\,A + 0.3\,A$
$I = 0.4\,A$

d) $I_2 = I_3 = I_1 = 0.3\,A$

Zadatak 2

$I_1 = 0.5\,A$
$t = 1\,min = 60\,s$
Q u žarulji 2

$Q = I_2 \cdot t$

$I_2 = I_1 = 0.25\,A$

$Q = 0.25\,A \cdot 60\,s$

$Q = 15\,A$

ZADATAK 3