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Q1.
Electrical energy consumed by an electrical appliance depends on:
1. Power rating of the appliance.
2. Time for which the appliance is used.
Q2.
60 watt bulb, because power is inversely proportional to the resistance.
Q3.
Kilowatt-hour is the commercial unit of electric energy.
Q4.

V = 220 V, P = 100W
R=?
We know that
$P = V^2/R$
Thus
$R = V^2/P = 220^2/100 = 484$ohm

Q5.
(i) joule
(ii) watt
Q6.
(i) Electric power
(ii) Electric energy
Q7.
Electric power has the unit of watt.
Q8.
kWh is the short form of kilowatt-hour, which is the commercial unit of electrical energy.
Q9.

$P=V^2/R$
R is fixed.
V becomes double.
Now, $P = (2V)^2/R = 4\,V^2/R$
So, the electric power becomes four times its previous value.

Q10.
Other information is that it will consume energy at the rate of 36 J/s.
Q11.
P = 920W, V = 230V, I=?
We know that
P = V x I,
920 = 230 x I
I = 920/230 = 4amp
Q12.
When an electrical appliance consumes electrical energy at the rate of 1 joule per second, its power is said to be 1 watt.
1 watt = 1 volt x 1 ampere.
Q13.
One watt hour is the amount of electrical energy consumed when an electrical appliance of 1 watt power is used for 1 hour.
1 watt hour = 3600 joules.
Q14.

I = 5 amp, R = 100 ohms, t = 2h
We know that
Electric energy consumed = P x t = I^2Rt
= 52 x 100 x 2
= 5000 Wh
= 5 kwh
We know that 1kwh = 3.6 x 106 J
Therefore, 5kwh = 5 x 3.6 x 106 J = 18 x 106 J
Q15.
V = 220V, I = 0.5amp, P=?
We know that
P = VI = 220 x 0.5
P = 110 watt
Q16.
(i) R = 300 ohm, I = 1 A, t = 1h
$P = I^2R = 1^2 \times 300 = 300$ W
E = P x t = 300 x 1 = 300 Wh

(ii) R = 100 ohm, I = 2 A, t = 1h
$P = I^2R = 2^2 \times 100 = 400$ W
E = P x t = 400 x 1 = 400 Wh

Hence, in case (ii), the electrical energy consumed per hour is more.

Q17.
V=220V, P=2.2 kW = 2200 W, t=3h
We know that
Electrical energy consumed = P x t = 2.2 x 3 = 6.6 kWh
We have, P = V x I
2200 = 220 x I
I = 10amp

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Q18.
Case 1:
Power, P_1 = 60W
Number, n_1 = 2
Time for use, t_1 = 4h everyday
Electrical energy consumed everyday, $E_1 = n_1 \times P_1 \times t_1$
$= 2 \times 60 \times 4 = 480$ Wh = 0.48kWh
Electrical energy consumed in 30 days=30 x 0.48=14.4kWh

Case 2:
Power, P_2 = 100W
Number, n_2 = 3
Time for use, t_2 = 5h everyday
Electrical energy consumed everyday, $E_2 = n_2 \times P_2 \times t_2$
$= 3 \times 100 \times 5 = 1500$ = 1.5kWh
Electrical energy consumed in 30 days=30 x 1.5=45kWh

Total electrical energy consumed in 30 days=14.4kWh + 45kWh = 59.4kWh

Q19.

V=250V, I=0.4amp

(i) We know that

Power=VI=250X0.4=100watt
(ii) We have
$P=I^2R$
$100=0.4^2XR$
R=625ohm

Q20.

Given

P=4kw, V=220v

(a) I=?

Power=VI=250XI

4000=250I

I=16amp

(b) R=?

$P=I^2R$

$P=16^2XR$

$R=4000/16^2$

R=15.25ohm

(c) Energy consumed in two hour=PXt

=4X2

=8kw-hr

(d) If 1kwh=Rs 4.6

total cost=8 x 4.6=Rs 36.8

Q21.

I=5amp, V=220volt, t=2h

P=?, E=?

P=VXI

=220X5

=1100watt

=1.1kW

Energy consumed, E=PXt

=1.1X2

=2.2kWh

Q22.

Case 1: TV set
P=250W=0.25kWh
t=1h
Energy consumed=PXt=0.25X1=0.25kWh

Case 2: Toaster
P=1200W=1.2kW, t=10min=10/60=1/6h
Energy consumed=PXt=1.2X(1/6)=0.2kWh

Thus, TV uses more energy.

Q23.

(i) $V=6\text{volt}, R_1=1\Omega, R_2=2\Omega$

Equivalent resistance$=R_1+R_2=1+2=3\Omega$

Total current, $I=\frac{V}{R}=\frac{6}{3}=2A$

Current through $R_2=I_2=I=2A$

Voltage across $R_2=V_2=I_2R_2=2\times 2=4\Omega$

Power used in $R_2=I_2V_2=2\times 4=8W$

(ii)$V=4\text{volt}, R_1=12\Omega, R_2=2\Omega$

Voltage across $R_2=V_2=V=4V$

Current across $R_2=I_2=\frac{V_2}{R_2}=\frac{4}{2}=2A$

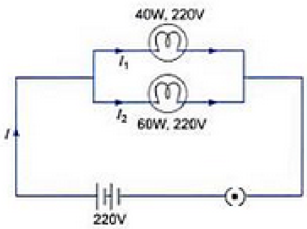
Power used in $R_2=I_2V_2=2\times 4=8W$

Q24.

Given 2 lamps:P_1=40W, P_2=60W

V=220V

(a)



(b) Voltage across both the bulbs is same and is equal to 220V.
Current through 40W lamp = $I_1 = P_1/V$ = 40/220 A
Current through 60W lamp = I2 = P2/V = 60/220 A
Total current drawn from the electric supply = 40/220 + 60/220 = 0.45 A

(a) Energy consumed by 40 W lamp in 1 hr, $E_1 = P_1 \times t = 40 \times 1$ = 40Wh
1Wh = 3.6 kJ
$E_1 = 40 \times 3.6$ = 144 kJ
Energy consumed by 60W lamp in 1 hr, $E_2 = P_2 \times t = 60 \times 1$ = 60Wh = 216 kJ
Total energy consumed = 144 + 216 = 360 kJ

Q25.

Given V=230V, I=10amp

(a) P=VI

P=230X10

P=2300watt = 2300 J/s

(b) Energy consumed in minute = P x t = 2300 J/s x 60s = 138000 J

Q26.

For heater:
P=2kW, t=4h
E=Pxt=2x4=8kWh
For TV:
P=200W=0.2kW, t=4h
E=Pxt=0.2x4=0.8kWh
Lamps:
P=100W=0.1kW, t=4h, n=3
E=nxPxt=3x0.1x4=1.2kWh

Total energy consumed = 8+0.8+1.2 = 10kWh
Cost of 1kWh = Rs. 5.50
Cost of 10kWh = Rs. 5.50 x 10 = Rs. 55

Q27.

I=13amp, V=230V
Power=VI
=230X13
=2990W
P=2.99kW

Q28.

Given :- V=230V, I=0.4amp
Rate at which electric energy is transferred = Power
Power = VxI
= 230 x 0.4
= 92 W = 92 J/s

Q29.

(a) The rate at which electrical work is done or the rate at which electrical energy is consumed, is known as electric power.

It is given by

P=VI=watt

(b) Given: V=3V, I=0.5amp

(i) R=?

We know that V=IR
3=0.5R

R=6ohms

(ii) Power of lamp=VI

=3x0.5

=1.5watt

(c) One kilowatt hour is the amount of electrical energy consumed when an electrical appliance having a power rating of 1 kilowatt is used for 1 hour.

1kWh=3.6x10^6J

(d) Given P=500W=0.5kW, t=20hr

We know that

Energy consumed =Pxt=0.5X20

=10kwh

Total cost =10xcost per uint

Cost per unit=Rs. 3.9 per unit

Therefore, total cost=10x3.9=Rs 39

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Q41.
By reducing the length of element the resistance will decrease. Power is inversely proportional to resistance. So, this will result in more consumption of energy.
Q42.
(a) Lamp; because least current is flowing through it.
(b) Large current drawn by the kettle; Earth connection needed.
(c) We know that
P = VI
V = 240V, I = 8.5A
P = 240 x 8.5 = 2040 W = 2.04 kW
(d) When connected to 240 V supply, P = 2040W
R = V^2/P = 240^2/2040
R = 28.23ohm
Now, when V = 120 V, R = 28.23 ohm
I = V/R =120/28.23 = 4.25 A
Q43.
(a) 42919
(b) 42935
(c) 42935 - 42919=16 units
(d) 24 hours
(e) Cost of 1 unit = Rs. 5
Cost of 16 units = 16x5 = Rs. 80
Q44.
P = 10W, V = 220V, I = 5A
We know that
P = VI
= 220 x 5
P = 1100W
Power of one bulb = 10W

Total no. of bulbs that can be connected = 1100/10 = 110
Q45.

Let resistance of each lamp=R ohms.

Case 1: Parallel connection

Resultant resistance= $\frac{1}{\frac{1}{R}+\frac{1}{R}} = \frac{R}{2}$

Electric power consumed $P_1 = \frac{V^2}{R} = \frac{220^2}{R/2} = \frac{96800}{R}$

Case 2: Series connection

Resultant resistance=R+R=2R

Electric power consumed $P_2 = \frac{V^2}{2R} = \frac{24200}{R}$

$\therefore \frac{P_1}{P_2} = \frac{96800}{R} \Big/ \frac{24200}{R} = \frac{4}{1}$

*********** END **********