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Q1.
Heat produced is directly proportional to the square of current.
Q2.
Heat produced is directly proportional to the square of current.
If current I is doubled, heat H will be four times.
Q3.
Two effects of produced by electric current are:
(a) Heating effect
(b) Magnectic effect
Q4.
Heating effect
Q5.
Heating effect
Q6.
Electirc heater and electric fuse.
Q7.
Argon and nitrogen.
Q8.
Filament type electric bulbs are not power efficien because most of the electric power consumed by the filament of a bulb appears as heat and only a small amount of electric power is converted into light.
Q9.
The connecting cord of the heater made of copper does not glow because negligible heat is produced in it by passing current (because of its extremely low resistance); but the heating element made of nichrome glows because it becomes red-hot due to the large amount of heat produced on passing current (because of its high resistance).
Q10.

(a) Heat produced, $H=I^2Rt$

(b) Given: R=20ohm, I=5amp, t=30s

We know that $H=I^2Rt$

$H=5^2x20x30$

H=15000 J

Q11.
Heat produced by an electric current depends on the following factors:
(i) Heat produced is directly proportional to square of current.
(ii) Heat produced is directly proportional to resistance.
(iii) Heat produced is directly proportional to the time for which current flows.
Q12.

(a) Joule's law of heating states that heat produced in joules when a current of I amperes flows in a wire of resistance R ohms for time t seconds is given by $H = I^2Rt$.

Thus the heat produced in a wire is directly proportional to:

(i) Square of current

(ii) Resistance of wire

(iii) Time for which current is passed

(b) Given: R_1=40ohms, R_2=60ohms (in series), V=220V, t=30sec
We know that

Total resistance, R=40+60=100ohms

By Ohm's law,

V=IR

I=V/R

I=220/100=2.2amp

Putting the values of I, R and t in eq. $H=I^2RT$

$H= 2.2^2 \times 100 \times 30$

H= 14520 J

Q13.
If air is filled in an electric bulb, then the extremely hot tungsten filament would burn up quickly in the oxygen of air. So, the electric bulb is filled with a chemically unreactive gas like argon or nitrogen. Thes gases do not react with the hot tungsten filament and hence prolong the life of the filament of the bulb.
Q14.
Tungsten is used for making the filaments of electric bulbs because it has a very high melting point. Due to its very high melting point, the tungsten filament can be kept white hot without melting away. Also, tungsten has high flexibility and low rate of evaporation at high temperature.
Q15.
The connecting wires of the heater get only slightly warm because they have extremely low resistance due to which negligible heat is produced in them by passing current.
Q16.

Given: I=4amp, t=10min=10x60=600sec, $H=2.88x10^4J$

(a) We have

$H=I^2RT$

$28800=4^2xRx600$

R=3ohms

We know that

$P=I^2xR$

$=4^2x3$

P =48W

(b) V=?

We know that

V=IR

V=4x3

V=12V

Q17.

Given: R=200ohms, I=2.5amp, t=1sec
We know that
$H=I^2RT$
$H=2.5^2X200X1$
H = 1250 J/s

Q18.

Given: R=8ohms, I=15amp, t=1sec
We know that
$H=I^2RT$
$H=15^2X8X1$
H=1800J/s

Q19.

Given: R=25ohms, V=12V, H=?, t=60sec
V=IR
12=25XI
I=0.48amp
We have
$H=I^2RT$
$H=0.48^2X25X60$
H=345.6J

Q20.

Given: H=100J, t=1sec, R=4ohms,
We know that
$H=I^2RT$
$100=I^2X4X1$
$100/4=I^2$
I=5amp
V=IR
V=5X4
=20V

Q21.

(a) When an electric charge Q moves against a p.d. V, the amount of work done is givenn by
W=Q x V -----(1)
We know, current, $I=\frac{Q}{t}$
Q = I x t -----(2)
By Ohm's law, $\frac{V}{I}$ = R
V = I x R -----(3)
Putting eqs. (2) and (3) in eq, (1),
W=I x t x I x R
$W=I^2Rt$
Assuming that all the electrical work done is converted into heat energy, we get
Heat produced, $H=I^2Rt$ joules
This relation is known as Joule's law of heating.

(b) Given: P=12W, V=12V, t=60sec
P=VI

I=P/V=12/12=1A

V=IR

R=V/I=12/1=12ohm

$H=I^2Rt$

$H=1^2x12x60$

H=720J

(c) The heat produced by the heater will become one-fourth because heat produced is directly proportional to the square of the current.

(d) When an electric current is passed through a high resistance wire, the wire becomes very hot and produces heat. This effect is knows as heating effect of current. This effect is used in room heaters and electric ovens.

(e) Tungsten is used for making the filaments of an electric bulb.

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Q31.
(a) S; because it has high resistivity of 11/10000000 ohm-m (it is actually nichrome).
(b) Q; because it has very low resistivity of 1.7/100000000 ohm-m (it is actually copper).
(c) R; because it has very very high resistivity of 1.0 x 100000000000000 ohm-m (it is actually rubber).

Q32.
(a) The filament wire becomes white hot where as other wires in the circuit do not get heated much.
(b) High resistance of filament wire accounts for this difference.
Q33.
In series, because total resistance in series connection is more than that in parallel connection.
Q34

Given: V=220V, P_{min}=360W, P_{max}=840W

For minimum heating case:
We know that
P_{min}=VI
360=220XI
I=1.63amp
R=V/I
R=220/1.63
R=134.96ohms

For maximum heating case:
We know that
P_{max}=VI
840=220XI
I=3.81amp
R=V/I
R=220/3.81
R=57.74ohms

Q35.
Electric iron , electric oven, water heater, room heater.

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