ENGINEERING SCIENCE - CSEE 2000

Solutions from: Maktaba by TETEA

By Yohana Lazaro

1.(a)(i) micrometer screw gauge

(ii)Vernier caliper.

(b)Force is the pull or push of an object. SI unit is Newton.

2.(a)force of gravity is the force which pulls the objects towards the center of the earth, while centripetal force is the force which pulls the rotating body towards the fixed point.

(b). Types of equilibrium:-

-stable

-unstable

-Neutral

(c) Types of friction:-

-static friction

-dynamic friction.

3(a)required is the horizontal component of the force = Fcos50°

H.C = 10 cos50°

Hence the force along the ground is 6.43N.

(b)(i)Uniform velocity is the constant rate of changing displacement.

(ii)Relative velocity is the velocity of a substance relative to that of another substance.

4.(a) Specific heat capacity is the amount of heat required to rise the temperature of a unit mass of a substance by 1K, While thermal capacity is the amount of heat required to rise the temperature of a substance by 1 K.

(b) Elasticity is the property of a body to gain its original shape when a load is removed from it.Hooke's law states that the applied force is proportion to the extension, at elastic limit.

5.(a)Beat is the interference pattern between two sounds of slightly different frequencies.

(b) Velocity = frequency x wavelength, frequency =V÷wav.length

f=(3000000000 ÷150) = 20000kHz

6.(a) Polarity is determined by Repulsion of the two poles of the magnets.

(b) Right hand rule states that when the solenoid is held to the right hand such that the fingers point the direction of magnetic field, then the thumb will point to the direction of current.

7.(a)Ampere is the basic unit of electric current.

(b) Coulumb is the unit of electric charge.

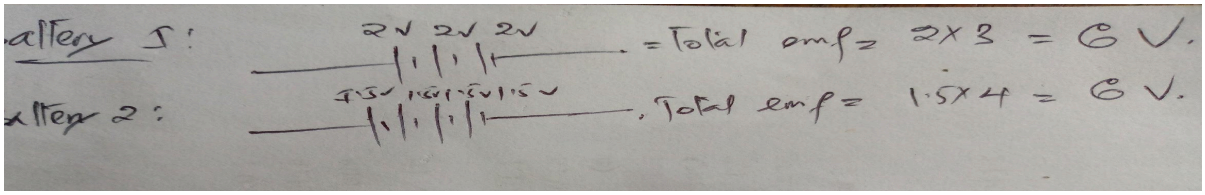
9(a)power, P= VI, I = P/V

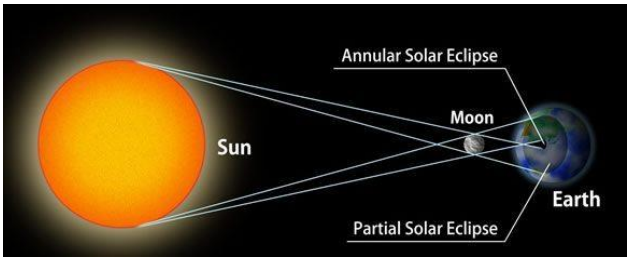
-I = 60÷240= 0.25A

(b)R = V/I = 240/0.25

= 960 ohm

10.Annular eclipse occurs when the moon covers the sun's center,leaving the sun's visible outer edges to form a ring of fire or annular around the sun.





11.Let the final temperature be t.

- copper, Q = 0.25 x (100-t) x 400 = 100(100-t) J

-Al.Q = 0.01 x 900 x (t-10) = 9(t-10)J

-spirit.Q = 0.12 x (t-10) x 2400 = 288(t-10)

From, heat lost = Heat gained

100(100-t) =(9(t-10) +288(t-10))

t= 32.7°C

12.(a) Kilowatt hour is the product of power in Kilowatt s and time used .

(b)Total power used = (5 x 60)+(4 x 100) =700W

In kW-h = 0.7kW x 8h = 5.6kWh

Then,cost = 5.6 x 20 = 112/=

13.volume = 559 x 0.002 = 11.739g

Then, coulumbs =11.739÷0.001118g/c

= 10500C

Time = Q÷I = 10500/2

The time is 5250 seconds.

14.(a)Law of flotation states that ``a floating body displaces its own weight of fluid in which it floats"

(b)mass of displaced Mercury = volume of iron x density of Mercury

Volume of iron= (156/7.8) = 20cm³

Mass mercury = 20 cm³ x 13.6g/cm³ = 272g= 0.272kg.

Then,force = 0.272 x 9.81

Minimum force = 2.67N

15.-absolute pressure given, P = (1.2 +10)= 11.2kgf/cm²

-ab.temperature,T = (10+273)=283K

-then,at t= (273+37)=310K, pressure =?

Apply pressure law, P/T=p/t

p = (11.2x310)/283 = 12.27kgf/cm²

Then, pressure = 12.27-10

=2.27kgf/cm²

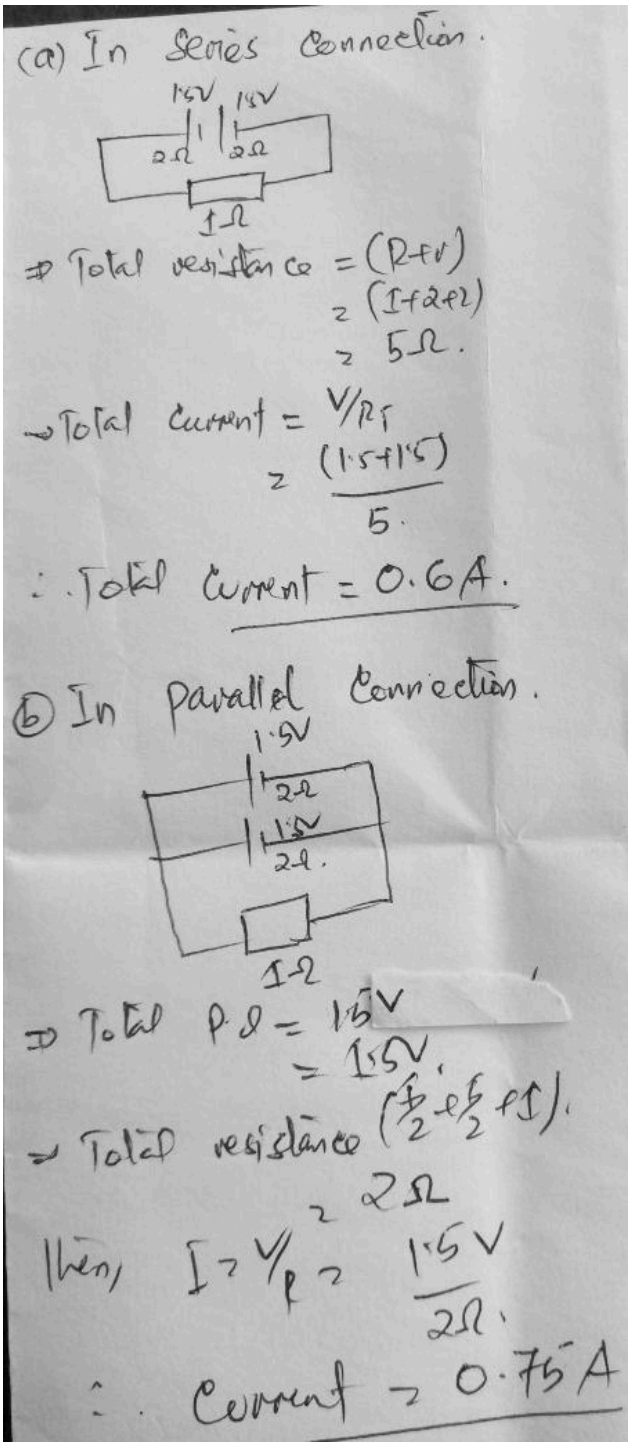
16.at s=18m, u= 0m/s, t=3s

From s= ut + ½at², 18=0+½(a)(3)², a = 4m/s²

Then, v =u + at

= 0 + (4)(8)

Velocity is 32m/s.



18.From, magnification, M = hi/ho= v/u

So M = 1/2.5 = 0.4

Then, 0.4= v/5, v= 2cm

From mirror formula, 1/f = 1/u+1/v

Apple real-is-positive, u=+5cm, v= +2cm.

Then,1/f=1/5+1/2,f = +1.43cm.

19.-temperature change = 29-9=20°C

From heat energy,Q = C x temp.change

= 950 x 20 = 19000J

From power = energy÷time

= 19000J÷300s= 63.3W

(a) Then,from power,$P=I^2/R$ so, $R= I^2/P$

$= 4^2/63.3$

Hence,the resistance is 0.25ohms

(b)From, V = IR

= 4 x 0.25

Hence,the p.d across the coil is 1.01V

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