ENGINEERING SCIENCE - CSEE 2007

Solutions from: Maktaba by TETEA

By Yohana Lazaro

1.

i	ii	Iii	iv	v	vi	vii	viii	ix	x
B	A	C	A	A	A	A	D	D	A

2.-Area in water = 180 x 70 = 12600 cm^2

- Mass = 37800g

- Volume in water =mass/ density of water

=37800 /1 = 37800 cm^3

Then, height = volume/area

= 37800/12600

= 3 cm

3. From, P = density x g x height

= 13600 x 9.81 x 0.76

Pressure = 101396.16 N/M^2

4.From, Q = mct

So, mass, m = Q/ct

= (80000)/ (390 x (60-15))

= 4.56 kg

5.-Area = $\pi (2 \times 10^{-3})^2/4 = 3.14 \times 10^{-6}$ m^2

Tensile stress = force/Area

= 50/ (3.14×10^{-6})

= 15.92×10^6 N/M^2

6. Voltmeter is a device used to measure the potential difference of an electric current, while the Voltameter is the device used to measure the electric charge through electrolytic action.

7. (a)capacitance

(b)inductance

(c) Magnetic flux density

8. From, coefficient of liner expansion = $\frac{increase\ in\ length}{orig.\ length\ x\ temp.\ change}$, so

Temperature change = $\frac{increase\ in\ length}{orig.\ length\ x\ coefficient\ of\ linear\ expansio}$

= $\frac{(20.096-20)}{20\ x\ 2.4\ x\ 10\text{^}-5}$ = 200^0C

Then, required temp. = 200 + 15

= 215^0C

9.- R = V/I

= 4.5/0.75 = 6Ω, but 1.5Ωper meter then

Then, length = 6/1.5

Length of wire will be 4m

10. Sensible heat is the heat which can rise the temperature of a substance while Latent heat is the heat which can change the state of a substance.

11. Recall that, square root of tension is proportional to frequency, so

$F = k\sqrt{T}$, $(f_1/f_2)^2 = T_2/T_1$

$T_2 = (400/600)^2$ x A

The tension is = 0.44A N

12.-Let mass of steam be m,

-sensible heat of water = 400 x 20^0 x 4.2 = 33600 J

-sensible heat of copper = 250 x 0.4 x 20^0 = 2000 J

-sensible heat of ice = 50 x 4.2 x 20^0 = 4200 J

-Latent heat of fusion of ice = 50 x 336 = 16800 J

-Latent heat of vaporization of steam = m x 2260 = 2260m J

- Sensible heat of steam = m x 4.2 x 20 = 84m

From heat lost by steam = heat gained by water + ice + copper can

(84m + 2260m) = (33600 + 2000 + 4200 + 16800)

Hence, mass = 24.15g

13. (a)Applying real-is-positive,

U = -20cm, f = -15

1/f = 1/u + 1/v, 1/-15 = 1/-20 + 1/v, V = -60cm

Magnification,M = v/u

= 60/20 = 3

Hence, position = 60cm in front of lens and the magnification is 3

(b)At u = -5cm, 1/f = 1/u + 1/v

1/-15 = 1/-5 + 1/v, V = 7.5cm

M = 7.5/5 = 1.5

Hence, position = 7.5cm behind lens, magnification is 1.5

14. Consider the figure below;-

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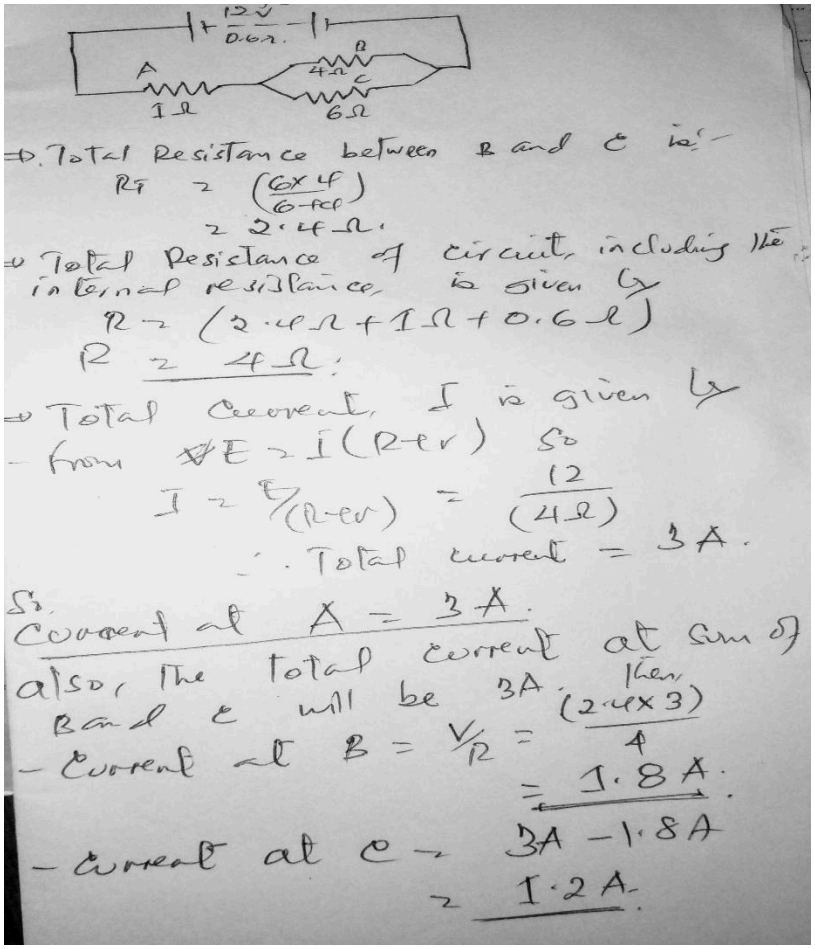


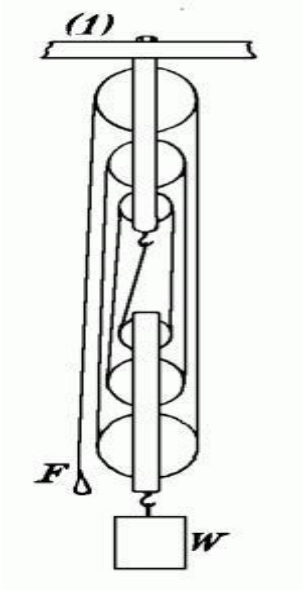
15.(a)magnetic flux is the number of magnetic lines passing through a given closed surfance.

(b)Given, No. of turns,N = 2000, current = 5A, time = 1/10 s, magnetic flux,Φ= 4mWb = 4 x 10^{-3}Wb

-From emf = N$\frac{d\Phi}{dt}$ = 2000 x $\frac{4-(-4)}{1/10}$ = 160000mV = 160V

Hence the average emf = 160 V

16(a)Pulley system.



(b)(i)Efficiency = MA/VR x 1000%

= (4500/1000)/6 x 100

= 75%

(ii) Work done by load = 500 x 9.81 x 2 = 9810J

Work done by effort = 1000 x 2 = 2000J

Energy lost = 2000 – 9810 = -7810 J

Negative means energy was lost.

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