ENGINEERING SCIENCE - CSEE 2009

Solutions from: Maktaba by TETEA

By Yohana Lazaro

1

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

2.-Total power used = (500W + (10 x 100) W + 6000W)

= 7500W

-then, convert into kWh, = 75kW x 20h

=1500kWh

-then, if 10/= = 1kWh, then 1500kWh = 15000/=

The cost is 15000/=

3. KE = ½ mv^2, 50.4km/h = 14m/s

= ½ x 2000 x 14^2

= 196000J

4. (a) from 360^0 = 2π rad, so 87^0 = 1.515 radians

(b)Linear velocity = ω x r

= 20 x 0.25

= 5m/s

5.-Charles' law states that '' the volume of a given mass of gas is proportional to absolute temperature at constant pressure''

-Boyle's law states that '' the volume of a given mass of gas is proportional to its pressure at constant absolute temperature''

6.-focal length f = - 20 cm, u=? But magnification = v/u, so v = Mu

From, 1/f = 1/v + 1/u, but v = Mv, then 1/f = 1/Mu + 1/u, on solving

U = -25cm

7. From α =($R_2 - R_1$)/R_1($T_2 - T_1$) so, R_2-3 = 0.00403 x 3 x (60-15)

Resistance = 3.544Ω

8. Total mass = (10^{-6} x 1000) + (8 x 10^{-7} x 1027) = 18216 x 10^{-3} kg

Total volume = $10^{-6} + (8 \times 10^{-7}) = 1.08 \times 10^{-5}\ m^3$

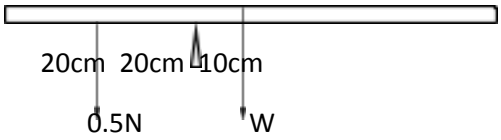
Total density = $(18216 \times 10^{-3})/ (1.08 \times 10^{-5}) = 16866.7 \times 10^{2}\ kg/m^3$

9. Input power = 250 x 25 = 6250W

- Efficiency = 6250/7500x 100%

= 83.3%

10.



From clockwise moment = anticlockwise moment, take moments about wedge,

(0.5 x 20) = (10 x W)

Weight of rule =1N

11. Voltameter is an instrument used to measure electric charges through electrolytic action.

Voltmeter is an instrument used to measure electric potential in volts.

12. (a) Heat is the form of energy which transfers from one point to another due to difference in temperature between those two points, Temperature is the measure of degree of coldness or hotness of the body.

(b) From heat lost = heat gained

Let final temperature be t, then

5 x (35 x t) x 4200 = 6 x 4200 x (t-8)

Resulting temperature will be 11.55^0C

13(a) angular velocity, $\omega = 0 + \alpha t$

$= 0 + (2 \times 50)$

$= 100$ rad/s

$= 15.92$ rev/s

(b)-time during deceleration = 20 seconds, w_2=0rad/s, w_1= 100rad/s

Then deceleration = (0-100)/20

$= 5\ rad/s^2$

Revolutions = (15.92 + 0)/2 x 20

= 159 revolutions

14.(a)Acceleration is the rate of change of velocity.

Recall that Force, F = Ma

(i) 100 = (10 x a)

Acceleration = $10m/s^2$

(ii) Force – friction = Ma

(100 – 80) = 10a

Acceleration = $2m/s^2$

15. (a) (i) Mechanical advantage is the ratio of work done output to work done input.

(ii)Velocity ratio is the ratio between distance moved by effort and that moved by load.

(iii)Efficiency is the ratio between mechanical advantage and velocity ratio.

(b)(i) 0.8 = (500 x 5)/ (25 x E), effort = 125N then,

Total work done = (500 x 5) + (125 x 25)

= 5625 J

(ii)Effort = 125 N

16(a) As an ammeter, a shunt must be connected in parallel so,

$(I-I_g)R_s = I_gR_g$ solving for R_s

A required shunt is 0.026Ω

(b)As a voltmeter, multiplier is to be connected in series so,

From, $V = (R_s + R_g)I_g$ on solving for R_s

Multiplier is 999.5Ω

Prepared by;-

Yohana P Lazaro

0756274618, 0624876331, mchelezdo2@gmail.com