PHYSICS 1 2013 - NECTA FORM FOUR

Solutions from: Maktaba by TETEA

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

2.

i	ii	iii	iv	v	vi	vii	viii	ix	x
H	G	M	L	K	O	E	I	C	J

3.

i. METEOR
ii. SOUND QUALITY
iii. ANGLE OF DEFLECTION OR MAGNETIC VARIATIONS
iv. SELF INDUCTANCE
v. CONSTRUCTIVE INTERFERENCE OF SOUND WAVES
vi. FROST
vii. DIFFUSION
viii. SECOND
ix. RECTIFICATION
x. MULTIPLIER

4. (a)

boiling	**evaporation**
-happens throughout the liquid	-happens on the liquid surface
-occurs at particular temperature	-occurs all temperatures
-Has no cooling effect	-has a cooling effect
-it is rapid	-it is slow

(b)(i) since it is cooler than he rest of the room, the cold bottle acts as a condenses to form tiny droplets.

(ii)clouds help to retain heat emitted by the earth and so insulate the earth surface.this higher temperature reduces the likelihood of water to freeze and cause frost.

(c)(i) Coefficient of linear expansivity is the fraction of its original length by which a fod of a substance increases per Kelvin rise in temperature.SI unit is /K

(ii)original length = 1m

Or. Temperature = 213K

Change in length = 0.003m

Final temperature = 373K

From, coefficient of expansion = (change in length)/(original length x temp. change)

=0.003/(1 x (373 – 213)

$= 5 \times 10^{-5}/K$

5. (a)It means that it takes 64 days for half-life of the radioactive nuclei present in a sample of a substance to decay and decrease by 50%, and become stable nuclei.

(b) (i)Activity $A_0 = 256min^{-1}$

Activity, $A_t = 32min^{-1}$

Recall that, $A_t = A_0 \times (1/2)^{t/t1/2}$

$32 = 256 \times (1/2)^{t/2}$

$t_{½} = 6min$

hence it takes 6 minutes

(ii)After 6 minutes

Amount = $A_0 \times (1/2)^{t/2}$ t = 6

Amount/$A_0 = (1/2)^{6/2}$

So, 1/8 of the particles will not have decayed.

(c)(i) Nuclear fission is the union of two small nuclei to form one larger nucleus.

(ii) $^{238}_{92}U \longrightarrow {}^{A}_{B}Th + 2(^{4}_{2}\text{alpha}) + 2(^{0}_{-1}\text{ beta})$

A = 238 – 2 x 4 – 2 x 0 = 238 – 8

A = 230

B = 92 -2 x 2 – (2 x -1)

B = 90

Equation will be $^{238}_{92}U \longrightarrow {}^{230}_{90}Th + 2(^{4}_{2}\text{ alpha}) + 2(^{0}_{-1}\text{beta})$

6. (a)(i) Nylon clothes cracks because they become electrified when stay on the body by friction.During undressing the clothes are suddenly separated from the body which is oppositely charged and so the separation creates tiny sparks.

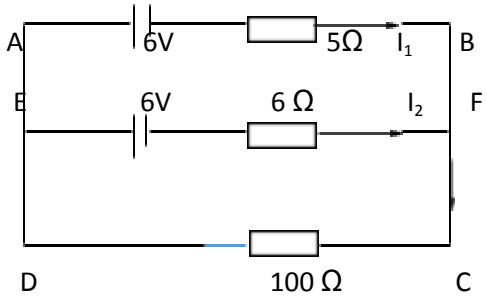
(ii)The metal chain to the ground serves to discharge the tank from any charge acquired by friction and so prevents sparks and explosion when the spark meets petrol.

(b)(i) When ebonite is rubbed with fur the rod acquires negative charge and the fur becomes positively charged.

(ii)When glass is rubbed with silk, the glass acquires positive charges and silk negative charges.

(c) (i)Electric current is the flow of electrons in a conductor caused by existence of a potential difference across it.

(ii)



-Consider ABCD

$6 = 5I_1 + 10(I_1 + I_2)$

$6 = 15I_1 + 10I_2$……. (i)

-Consider EFCD

$6 = 6I_1 + 10(I_1 + I_2)$

$6 = 16I_2 + 10I_1$……(ii)

On solving, $I_1 = 0.26$, $I_2 = 0.21$

Then current at 10Ω = 0.21 + 0.26 = 0.47 A

7. (a)An altimeter is an instrument used to measure the altitude or height of an object above sea level.

(b) (i)At high altitude, the atmospheric pressure is low and internal body pressure is higher, weak blood vessels in the body may rupture and so nose bleeding can occur.

(ii)due to small surface area of pebbles the reaction force of the pebbles on your feet divide by the small pebble's surface area makes the pressure on your feet to be large and so you experience pain.

(c) (i)

-pressure in liquids = density of liquid x g x heigth

-pressure at cube's bottom = density x g x 10cm

= 1000 x 10 x 0.1

= 100N/m^2

-pressure at the cube's top = density x g x (10 – 2)

= 100 x 10 x 0.08

= 800N/m^2

-difference in pressure = 100 – 800

= 200 N/m^2

(ii)apply law of flotation,

Weight of displaced water = its density x volume of cube x g

= 1000 x $(2/100)^3$ x 10

= 0.08N

8. (a) (i)Impulse is the product of force acting o the body and the time taken by that force to act.

(ii)Seat-belts are allowed to stretch upon collision in order to increase the time of the force exerted by the belts on the body acts. This will reduce the force exerted to the body.

(b)(i)Mometum is the product of a mass of the body and velocity at which it moves.

(ii) Impulse = change in momentum

Force x time = change in momentum

Force x 0.1 = ((4 x 10) – 0))

Force = 0.4 N

(c) KE = ½ xmv^2

= ½ x 2000 x 10^2

= 100,000J

(i)kinetic energy lost = 100,00J

(ii)It is lost due to overcoming friction between the tyres and the road.

9. (a) (i) Tsunami is a sea wave which is caused by disturbance on the ocean floor either by an earthquake or a volcanic activity.

(ii)Magma are molten rocks inside the earth's mantle which are ejected durind volcanic eruption.

(b) (i) Layers of the earth's atmosphere;

- Troposphere
- Stratosphere
- Mesosphere
- Thermosphere
- Exosphere

(ii)The troposphere is nearest the earth.

Importance; -

- Weather formation
- Supports living things through oxygen and CO_2 contained in it.

(c) (i) A constellation is a group of stars in space which are positioned to form patters and can be likened to objects, features or events on the earth.

(ii)Tides are cause by the gravitation pull of the moon on the oceans of the earth.

10. (a) (i)Laws of electromagnetic induction.

- Fraday's law of electromagnetic induction.

''an emf is induced whenever there is a change in magnetic fluxes linking the conductor''

-Lenz's law of electromagnetic induction.

''the direction of induced current is such hat to oppose the change that produced it''

(ii)Advantages of AC generator over DC generators

- The voltage produced can be easily stepped up
- They produce electricity without changes in composition of its parts.
- They can produce emf indefinitely needing to change parts.

- Their voltage can easily be stepped up or down

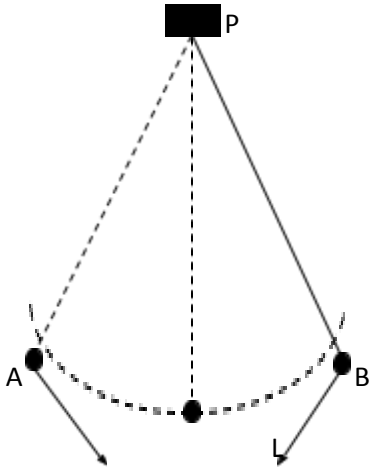
(b) The core of a transformer is made up of thin metal lamina in order to reduce the effects of eddy currents and back emf caused by the changing flux in the coil of transformer.

11. (a) (i) Applications of principle of conservation of energy;

- Pulling a catapult to throw a stone
- Winding the main spring of a mechanical watch
- Recharging a car battery
- The swinging of a simple pendulum

(b)(i) A simple pendulum is a very small heavy body suspended by a light inextensible string.

(ii)



-at position A, the body is momentarily stationary (zero kinetic energy) but has maximum potential energy as it starts swinging to position O.

-at position O, the bob has, maximum kinetic energy which takes it to position B.

- at position B, the bob has maximum potential energy and zero kinetic energy as it was at A.

(c) (i)A steam engine converts heat energy to mechanical energy.

(ii)A dynamo converts mechanical energy into electric energy.

(iii)A microphone converts sound energy into electric energy.

(iv)Geothermal power generators convert heat energy to electrical energy.