SENGEREMA SECONDARY SCHOOL

FORM SIX HOMME PACKAGE 2024

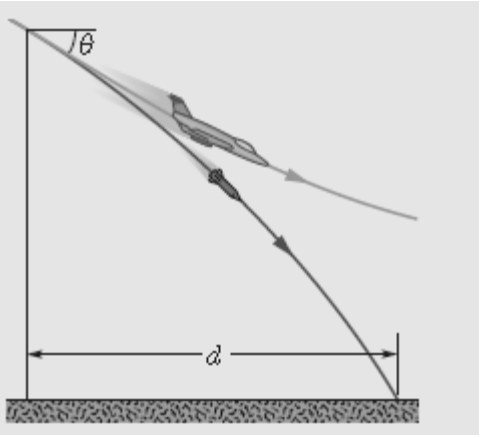
PHYSICS

MEASUREMENT

1. define the following terms: i) Uncertainty of result ii) units ii) physical quantity
2. A person measures his or her heart rate by counting the number of beats in 30s. If 40±1 beats are counted in 30±0.5 s, what is the heart rate and its uncertainty per minutes?
3. differentiate between dimensionless variables and dimensionless constants
4. The radius r of a circle inscribed in any triangle whose sides are a, b and c given by $r = \sqrt{\frac{(s-a)(s-b)(s-c)}{s}}$ where s is an abbreviation for $\frac{(a+b+c)}{2}$. Check this formula for dimensional consistency
5. How is the term limit of precision differ from the least count of measuring instrument**.**
6. . A thin copper wire of length L metres increases in length by 2% when heated through 10^oC. Calculate the percentage increase in area when a square copper sheet of length L metres is heated through 10^oC.
7. pressure P, velocity V, and time T are taken as fundamental physical quantities, what is the dimensional formula of force.
8. (ii) The position of a particle at time t is given by the relation $x = (\frac{V}{\alpha})(1 - C^{-\alpha t})$ where V is constant and α>0. Find the dimensions of V and α.

MECHANICS

1. A projectile is fired horizontally from a gun that is45.0 m above flat ground, emerging from the gun with a speed of250 m/s. (a) How long does the projectile remain in the air? (b) At what horizontal distance from the firing point does it strike the ground? (c) What is the magnitude of the vertical component of its velocity as it strikes the ground?
2. A certain airplane has a speed of 290.0 km/h and is diving at an angle of 30.0° below the horizontal when the pilot releases a radar decoy (Fig. below). The horizontal distance between the release point and the point where the decoy strikes the ground is *d* _ 700 m. (a) How long is the decoy in the air? (b) How high was the release point?



3. A body of mass m is tied to one end of a string of length l and revolves vertically in a circular path. At the lowest point of circle, what must be the $K.E.$ of the body so as to complete the circle

4. The speed of a particle moving in a circle of radius $0.1m$ is $v = 1.0t$ where t is time in second. Find the resultant acceleration of the particle at $t = 5s$ will be
5. A boy on a cycle pedals around a circle of 20 metres radius at a speed of 20 *metres/sec.* The combined mass of the boy and the cycle is $90kg$. Calculate the angle that the cycle makes with the vertical so that it may not fall $(g = 9.8\ m/\sec^2)$
6. Which statement is correct? (a) Net force causes motion. (b) Net force causes change in motion. Explain your answer and give an example.

7. . If the acceleration of a system is zero, are no external forces acting on it? What about internal forces? Explain your answers
8. Calculate the maximum deceleration of a car that is heading down a 6º slope (one that makes an angle of 6º with the horizontal) under the following road conditions. You may assume that the weight of the car is evenly distributed on all four tires and that the coefficient of static friction is involved—that is, the tires are not allowed to slip during the deceleration. (Ignore rolling.) Calculate for a car: (a) On dry concrete. (b) On wet concrete. (c) On ice, assuming that μs =0.100, the same as for shoes on ice.
9. A Saturn V's mass at liftoff was 2.80×106kg, its fuel-burn rate was 1.40×104kg/s, and the exhaust velocity was 2.40×103m/s. Calculate its initial acceleration.
10. A car moving at 10 m/s crashes into a tree and stops in 0.26 s. Calculate the force the seat belt exerts on a passenger in the car to bring him to a halt. The mass of the passenger is 70 kg.
11. What is the acceleration of a 5000-kg rocket taking off from the Moon, where the acceleration due to gravity is only 1.6m/s2, if the rocket expels 8.00 kg of gas per second at an exhaust velocity of 2.20×103m/s?
12. Calculate the final speed of a solid cylinder that rolls down a 2.00-m-high incline. The cylinder starts from rest, has a mass of 0.750 kg, and has a radius of 4.00 cm.
13. A flywheel in the form of a heavy circular disk of diameter 0.600 m and mass 200 kg is mounted on a frictionless bearing. A motor connected to the flywheel accelerates it from rest to 1 000 rev/min. (a) What is the moment of inertia of the flywheel? (b) How much work is done on it during this acceleration? (c) When the angular speed reaches 1 000 rev/min, the motor is disengaged. A friction brake is used to slow the rotational rate to 500 rev/min. How much energy is dissipated as internal energy in the friction brake?
14. Two solid spheres—a large, massive sphere and a small sphere with low mass—are rolled down a hill. Which sphere reaches the bottom of the hill first? Next, a large, low-density sphere and a small, high-density sphere having the same mass are rolled down the hill. Which one reaches the bottom first in this case?

15. . What happens to the period of a simple pendulum if the pendulum's length is doubled? What happens to the period if the mass of the suspended bob is doubled?

16. A stone is dropped from a height of 19.6m above the ground while a second stone is simultaneously projected from the ground with sufficient velocity to enable it to ascend 19.6m .When the stones would meet and Where the stones would meet.

17. A stone is thrown from ground level over horizontal ground. It just clears three walls, the successive distances between them being r and $2r$. The inner wall is 15/7 times as high as the outer walls which are equal in height. The total horizontal range is nr, where n is an integer. Find n.

18. A boy wishes to throw a ball through a house via two small openings, one in the front and the other in the back window, the second window being directly behind the first. If the boy stands at a distance of 5 m in front of the house and the house is 6 m deep and if the opening in the front window is 5 m above him and that in the back window 2 m higher, calculate the velocity and the angle of projection of the ball that will enable him to accomplish his desire.

19. A hunter directs his uncalibrated rifle toward a monkey sitting on a tree, at a height h above the ground and at distance d. The instant the monkey observes the flash of the fire of the rifle, it drops from the tree. Will the bullet hit the monkey?

20. A projectile of mass 20.0 kg is fired at an angle of 55.0° to the horizontal with an initial velocity of 350 m/s. At the highest point of the trajectory the projectile explodes into two equal fragments, one of which falls vertically

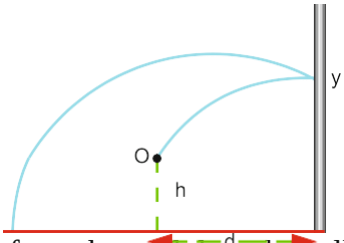
downwards with no initial velocity immediately after the explosion. Neglect the effect of air resistance:

(i) How long after firing does the explosion occur?

(ii) Relative to the firing point, where do the two fragments hit the ground?

(iii) How much energy is released in the explosion?

21. A ball is thrown from a height *h* above the ground. The ball leaves the point located at distance *d* from the wall, at 45° to the horizontal with velocity *u*. How far from the wall does the ball hit the ground (Fig.)?



21.

PROPERTIES OF MATTER

1. A 200-kg load is hung on a wire with a length of 4.00 m, a cross-sectional area of 0.200x 10^4 m^2, and a Young's modulus of 8.00x 10^{10} N/m^2. What is its increase in length?
2. A steel wire 1 mm in diameter can support a tension of 0.2 kN. Suppose you need a cable made of these wires to support a tension of 20 kN. The cable's diameter should be of what order of magnitude?
3. Define the terms surface tension and angle of contact
4. Explain why is it not possible to separate two pieces of paper glued together face to face?
5. Explain why is it not sensible to rub the canvas of a tent in wet weather ?
6. Give comments on the statement that " water droplets are slippery when they fall on an oily surface"
7. Give two factors which may change the value of surface tension
8. show that the excess pressure inside a soap bubble floating in a soap solution of surface tension γ is given by $\Delta P = \frac{4\gamma}{r}$ where r is radius of the soap bubble

9. Two spherical soap bubble of radii 30mm and 10mm coalesce so that they have a common surface. If they are made from the same solution and the radii of the bubbles remain the same after they join together. Calculate the radius of curvature of their common surface.
10. Define the terms Fatigue, Perfectly plastic material and Elasticity.
11. Differentiate ductile material from brittle material.
12. Differentiate stress from strain
13. A submerged wreck is lifted from a dock basin by means of a crane to which is attached a steel cable 10m long of cross-section area $5cm^2$. The material being lifted has a mass of 10^4kg and mean density of $8000kgm^{-3}$. Find the change in extension of the cable as the load is lifted clear of the water
14. Distinguish between shear modulus and bulk modulus.
15. Derive an expression for energy stored in an elastic string in terms of length L, extension e, and young's modulus E of the string, Assume the elastic limit of the string is not exceeded
16. List any four assumption made on kinetic theory of gases
17. Show that the mean kinetic energy of a gas is proportional to its absolute temperature
18. The specific heat capacity of an ideal gas at constant pressure $c_p = \frac{5}{2}R$,. The gas is contained in a closed vessel of volume $0.008m^3$ at 300k and pressure of $1.6 \times 10^6 Nm^{-2}$ if it is given $2.49 \times 10^4 J$ of energy . Compute the final temperature and pressure of the gas.
19. An Oxygen model kept at 27^oc and 1 atmospheric pressure is considered to be a sphere of radius $r = 2x10^{-10}m$ Calculate.
    Root mean square speed of Oxygen gas at this temperature
    Mean free path of the gas molecule
    Mean free time of Oxygen molecule at speed equal to its R.M.S speed

FLUID DYNAMICS

1. The aorta is the principal blood vessel through which blood leaves the heart in order to circulate around the body. (a) Calculate the average speed of the blood in the aorta if the flow rate is 5.0 L/min. The aorta has a radius of 10 mm. (b) Blood also flows through smaller blood vessels known as capillaries. When the rate of blood flow in the aorta is 5.0 L/min, the speed of blood in the capillaries is

about 0.33 mm/s. Given that the average diameter of a capillary is 8.0μm, calculate the number of capillaries in the blood circulatory system.

2. It is dangerous to stand close to railroad tracks when a rapidly moving commuter train passes. Explain why atmospheric pressure would push you toward the moving train.
3. Roofs are sometimes pushed off vertically during a tropical cyclone, and buildings sometimes explode outward when hit by a tornado. Use Bernoulli's principle to explain these phenomena
4. Using Bernoulli's equation, show that the measured fluid speed v for a pitot tube, is given by $v=\sqrt{\frac{2\rho' gh}{\rho}}$, where h is the height of the manometer fluid, ρ' is the density of the manometer fluid, ρ is the density of the moving fluid, and g is the acceleration due to gravity. (Note that v is indeed proportional to the square root of h, as stated in the text.)
5. What is meant by an ideal fluid and critical velocity
6. State the Torricelli's theorem
7. Water enters into an open tank at a rate of $0.025 m^3/s$ and leaves through a small hole of diameter 0.1m at its base . calculate the maximum height to what water can rise
8. write one form of Bernoulli's equation and from it identify the static pressure and dynamic pressure
9. Water flows in a pipe of cross-section area $40 m^2$. If at a certain point the static pressure is 1.12x105 pa and the total pressure is $2.12x10^5$pa. calculate the speed and volume per second of water passing in the pipe
10. A pipe is running full of water. At a certain point A, it tapers from 60cm diameter to 20cm diameter at B, The pressure difference between A and B is 100cm of water column. Find the rate of flow of water
11. Air streams horizontally across an aeroplane wing of area $4\,m^2$, weighing 300 kg. The air speed is 70 and 55 m/s over the top surface and the bottom surface, respectively. Find **(a)** the lift on the wing; **(b)** the net force on it.
12. A venturi meter has a pipe diameter of 20 cm and a throat diameter of 10 cm. If the water pressure in the pipe is 60,000 Pa and in the throat is 45,000 Pa, calculate the rate of flow of water in m^3/s.

13. A pitot tube which is used to determine the speed of an aircraft relative to air is mounted on the wing of a plane. The tube contains alcohol of density 810 kg/m^3 and registers a level difference of 15.0 cm. Assuming that the density of air at NTP is 1.293 kg/m^3, find the plane's speed in km/h relative to the air.

14. A garden sprinkler has 80 small holes each 2.5 mm^2 in area. If water is supplied at the rate of 2×10^{-3} m^3/s, find the average velocity of the spray.

15. If the speed of flow past the lower surface of the wing of an aeroplane is 100 m/s, what speed of flow over the upper surface would give a pressure difference of 1000 Pa? Assume an air density of 1.293 kg/m^3.

16. A venturi meter has a pipe diameter of 4 cm and a throat diameter of 2 cm. The velocity of water in the pipe section is 10 cm/s. Find **(a)** the pressure drop; **(b)** the velocity in the throat.

17. A large tank is filled with water at the rate of 70 cm^3/s. A hole of cross-section0.25 cm^2 is punched at the bottom of the tank. Find the maximum height to which the tank can be filled.

18. A tank of cross-sectional area A is filled with water up to a height h_1. Water leaks out from a small hole of area 'a' at the bottom. Find the time taken for the water level to decrease from h_1 to h_2.

19. A large tank is filled with water. The total pressure at the bottom is 3.0 atm. If a small hole is punched at the bottom what is the velocity of efflux?

20. Two tanks with a large opening are filled with a liquid. A hole of cross- sectional area A_1 is punched in tank 1 and another of cross-sectional area A_2 in tank 2 at depths h_1 and h_2, respectively. If $A_1 = 2$ A_2 and the volume flux is identical, then what should be the ratio h1/h2

21. A wide container with a small orifice in the bottom is filled with water and kerosene. If the water column measures 60 cm and kerosene column 40 cm, calculate the efflux velocity of water. Take the specific gravity of water as 1.0 and kerosene as 0.8 and neglect viscosity.

22. A wide vessel filled with water is punched with two holes on the opposite side each with cross-sectional area of 1.0 cm^2. If the difference in height of the holes is 51 cm, calculate the resultant force of reaction of the water flowing out of the vessel.

HEAT

1. What is a perfectly black body?
2. Give one limitation of Newton's law of cooling.
3. Explain why does good absorber of radiant energy appear black?
4. Explain why do two sheets of similar glass insulate much more effectively when separated by thin layer of air than when they are in contact?
5. A roof which measures 20m x 50m is blackened. If the temperature of the sun's surface is 600k,Calculate the solar energy incident on the roof per minute, Assuming that half of it is lost when passing through the earth's atmosphere.
6. A double welled flask may be considered to consist of concentric spherical vessels, the inner vessel of radius 10cm and the outer vessel of radius 11cm. The surface of the vessels are blackened and the space between them is evacuated . The inner vessel is filled with liquid nitrogen at its boiling point of -196^{o}c. It is found that when the temperature of the outer vessel is 17^{o}c the nitrogen evaporates at a rate of 0.25gs^{-1}. Calculate the value of the Stefan's constant. .
7. What is meant by thermometric property
8. Mention three qualities that makes a particular property suitable for use in a practical thermometer
9. In temperature measurement using thermocouple, it was found out that e.m.f varies with temperature according to the equation $E = a\theta + b\theta^2$ where a= 7.5x10^{-3}V^{0}C^{-1} and b= -1.6x10^{-5}VC^{-2} . Find the, Neutral temperature, Inversion temperature and Maximum emf detected by the thermocouple.
10. An aluminium saucepan in contact with hot plat has a base of diameter 20cm and a thickness of 0.5cm , if the saucepan

contain water boiling away at the rate of $0.15gs^{-1}$. Estimate the temperature at the lower surface of the saucepan vessel.

11. The resistance R_t of a platinum wire at a temperature t^oC measured on a gas scale is given by;- $R_t = R_o(1 + at + bt^2)$ where $a = 4 \times 10^{-3}$ and $b = 6 \times 10^{-2}$ what temperature will the platinum thermometer indicate when the temperature of the gas scale is 200°C?

12. A liquid cools from 90°C to 60°C in 6 minutes in a room of temperature 20°C. How much time will take to cool from 60°C to 40°C at the same room temperature?

13. During winter the room of a house should be keeps warm. Explain two ways in which the heat lost from the house by conduction can be prevented.

14. Explain why a body at 1000K is red hot whereas the body at 2000K is white hot?

15. Ice is forming on the surface of a pond. When it is 0.05m thick, the temperature of the surface of ice in contact with the air is -10°C while the surface in contact with the water is at a temperature of 0°C. Determine the rate of loss of heat per unit area from the water.

16. A body initially at 80°c cools 64°c in 5minutes and to 52 in the next 10minutes. What will be the temperature of the body after the next 15 minutes. And what is the surrounding temperature . assuming that it obeys Newton's law of cooling.

17. A small pond has a layer of ice on the surface that is 1 cm thick. If the air temperature is - 10°C, find the rate (in m/h) at which ice is added to the bottom of the layer. The density of ice is 917 kg/m^3, the thermal conductivity of ice is 0.59

W/m/K, and the latent heat of fusion is 333 kJ/kg. Assume that the underlying water is at 0°C.

18. An object is cooled from 85 to 75°C in 2 min in a room at 30°C. What time will be taken for the object to cool from 55 to 45°C.

19. Two steel balls of identical material and surface quality have their radii in the ratio 1:2. When heated to 100°C and left to cool, they lose their heat by radiation. Find the rate of cooling $d\theta/dt$ for the balls.

20. A resistance thermometer gives readings of 24.9 Ω at the ice point, 29.6Ω at the steam point and 26.3Ω at some unknown temperature. What is the unknown temperature on the Celsius scale?

21. Solar constant (S) is defined as the average power received from the sun's radiation per square metre of earth's surface. Calculate S assuming sun's radius (R) as 6.95×10^8 m, the mean earth–sun distance (r) as 1.49×10^{11} m, sun's surface temperature $T = 5740$ K and Boltzmann's constant $\sigma = 5.67 \times 10^{-8}$ W/m^2/K^4.

22. Calculate the temperature of the solar surface if the radiant intensity at the sun's surface is 63 MW/m^2. Stefan–Boltzmann constant $\sigma = 5.67 \times 10^{-8}$ W/m^2/K^4.

23. Calculate the amount of heat lost per second by radiation by a sphere 10 cm diameter at a temperature of 227°C when placed in an enclosure at 27°C ($\sigma = 5.67 \times 10^{-8}$ W/m^2/K^4)

VIBRATION AND WAVES

1. A sinusoidal wave traveling in the positive x direction has an amplitude of 15.0 cm, a wavelength of 40.0 cm, and a frequency of 8.00 Hz. The vertical displacement of the medium at and is also 15.0 cm, Find the angular wave number k, period T, angular frequency , and speed v of the wave.

2. A sinusoidal wave train is described by the equation m) y= 0.25m sin(0.30x - 40t) where x and y are in meters and t is in seconds. Determine for this wave the (a) amplitude, (b) angular

frequency, (c) angular wave number, (d) wavelength, (e) wave speed, and (f) direction of motion.

3. A sinusoidal wave of wavelength 2.00 m and amplitude 0.100 m travels on a string with a speed of 1.00 m/s to the right. Initially, the left end of the string is at the origin. Find (a) the frequency and angular frequency, (b) the angular wave number, and (c) the wave function for this wave. Determine the equation of motion for (d) the left end of the string and (e) the point on the string at m to the right of the left end. (f) What is the maximum speed of any point on the string?
4. Determine the speed of transverse waves on a string under a tension of 80.0 N if the string has a length of 2.00 m and a mass of 5.00 g. (b) Calculate the power required to generate these waves if they have a wavelength of 16.0 cm and an amplitude of 4.00 cm.
5. Explain how the Doppler effect is used with microwaves to determine the speed of an automobile.
6. Why is it not possible to use sonar (sound waves) to determine the speed of an object traveling faster than the speed of sound in a given medium?
7. A bat, moving at 5.00 m/s, is chasing a flying insect. If the bat emits a 40.0-kHz chirp and receives back an echo at 40.4 kHz, at what relative speed is the bat moving toward or away from the insect? (Take the speed of sound in air to be m/s.
8. Define the following terms i) Diffraction of light (ii) Polaroid
9. State six conditions for sustainable interference
10. A two slit young's experiment is done with a monochromatic light of wavelength 6000A^o. The slits are 2mm apart and the fringes are observed on a screen placed 10cm away from the slits and it is found that the interference pattern shifts by 5mm when a transparent plate of thickness 0.5mm is introduced in the path of one of the slits. What is the refractive index of the transparent plate?

ELECTROSTATICS

1. Vehicles carrying inflammable materials usually have metallic ropes touching the ground motion.why?

2. The leaves of an electroscope always diverge when we bring a charged body near it, without touching it. Why?
3. A bird perches on a bare high tension line and nothing happen to the bird. A man standing on the ground touches the same high power line and gets a fatal shock. Why?
4. State Coulomb's law of electrostatics
5. Two pith-balls each of mass 5×10^{-4} kg are suspended from the point by silk thread of 0.2m long. Equal charges are given to the balls. Which separate until the thread enclose an angle of 30°. Calculate the charge on each pith-ball. You may use $g=9.8ms^{-2}$.
6. Define the term capacitance of a capacitor and dielectric constant
7. . The plates of a parallel plate air capacitor consisting of two circular plates, each of 10cm radius, placed 2mm apart, are connected to the terminals of an electrostatic voltmeter. The system is charged to give a reading of 100 on the voltmeter scale. The space between the plates is then filled with oil of dielectic constant 4.7 and the voltmeter reading falls to 25. Calculate the capacitance of the voltmeter. You may assume that the voltage recorded by the voltmeter is proportional to the scale reading.
8. what do you understand by electric field?
9. What is meant by line of forces?
10. Mention two common properties of electric field lines
11. sketch the graph showing the variation of electric field strength E, against distance r, from the centre of the charged sphere.
12. Point charges of 5µc and-3µc are placed 0.25m apart
    i. Where can a positive third charge be placed so that the net force on it is zero?
    .
    ii. What if both charges are positive?

13. Show that the capacitance of isolated sphere of radius r and charge Q situated in air is given by $C = 4\pi\varepsilon_o r$.

14. Suppose you have a 9v battery, a 2.00μF capacitor and a 7.4μF capacitor. Find the charge and energy stored if capacitor are connected to the battery In series and in parallel.

15. 4.a i) Distinguish electric field and electric dipole.

16. Four-point charges of -4uC, +2uC, -2uC and +4uC are placed on corners ABCD of square respectively. Determine the strength of the electric field at the centre of a square of side 2m.

17. What is meant by the term electric potential

18. Two positive point charges of 16 x 10^{-10}C and 12x10^{-10}C are placed 10cm apart. Find thework done in bringing the two charges 4cm closer

19. Two spheres of different capacitance are charged to different potentials. They are thenjoined by a wire. Will a total energy increase, decrease or remain the same?

20. Calculate electric potential at the surface of the silver nucleus having radius3.4x10^{-14}mgiven that the atomic number of silver and charge e on proton are 47 and 1.6 x 10^{-19}C respectively.

21. Two insulated spheres of radii 1 and 3 cm at a considerable distance apart are each charged positively with 3×10^{-8} C. They are brought into contact and separated by the same distance as before. Compare the forces of repulsion before and after contact.

22. What is the maximum charge that can be given to a sphere of diameter 10 cm if the breakdown voltage of air is 2×10^4 V/cm.

23. Show that the capacitance, C , of a conducting sphere of radius a is given by $C = 4\pi\varepsilon_0 a$.

$$\frac{}{(q_1 - q_2)^2}$$

What happens to this energy?

11.1 Two spherical conductors of radii R_1 and R_2 and charges Q_1 and Q_2, respec- tively, are brought in contact and separated. Show that their charge densities will be inversely proportional to their radii.

11.2 A light spherical balloon is made of conducting material. It is suggested that it could be kept spherical simply by connecting it to a high-voltage source. The balloon has a diameter of 100 mm.

(a) What is the voltage of the source if the electric field on the balloon sur- face is 5 10^6 V/m?

(b) What gas pressure inside the balloon would produce the same effect?

(c) The voltage source is removed and the balloon remains at the same volt- age. Calculate the total electrostatic energy of the balloon.

24.

CURRENT ELECTRICTY

1. With one example in each case, distinguish between ohmic and non ohmic conductor.

2. A wire of resistance 0.5Ω and temperature coefficient of $4.3\times10^{-3}K^{-1}$ was connected to the circuit. If the ammeter reading is 2A when the temperature rises by 50°C, what will be the value of p.d across it?

3. The loop rule is based on conservation of energy principle and the junction rule is based on conservation of charge principle. Explain just how these rules are based on these principles.

4. Study the circuit diagram in figure 2 then answer the questions that follow;

What is the reading in ammeter and voltmeter in a figure 2?

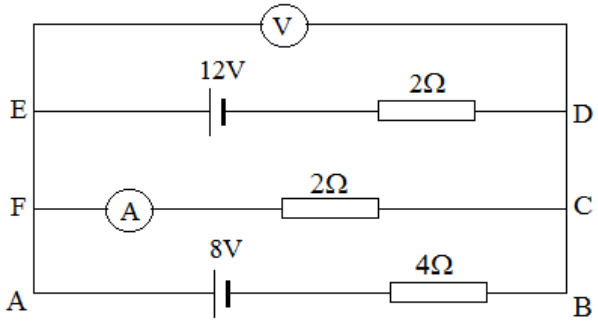


Figure 2

5. Give two differences between a.c and d.c as applied in current electricity.

6. An a.c power supply source is labeled 220V, 60Hz. What can you say about peak value and root mean square value of the source?
7. The SI unit of capacitive reactance is ohm (Ω), or second per farad ($\frac{s}{F}$). Show that the ohm is equivalent to second per farad.
8. The RLC series circuit is used for tuning a radio receiver and the incoming wave frequency f is obtained by varying the capacitor circuit in the receiver. If the value of R is 5Ω, L is 3mH and C is 1μF, determine;-
    (i) The value of incoming wave frequency.
    (ii) The impedance of the radio receiver at this frequency.

ELECTROMAGNETISM

1. Distinguish between magnetic field and magnetic flux.
2. A copper wire has 1.0x 10^{29} free electrons per cubic metre, a cross section area of 2mm² and carries a current of 5A. The wire is placed at right angle to a uniform magnetic field of strength 0. 15T.Calculate the force acting on each electron.
3. State Biort sarvat law and describe each term in the law.
4. A solenoid has a length of 1.23m and inner diameter 4cm it has 5 layers if windings of 850 turns each and carries a current of 5.57A, what is the magnitude of the magnetic field at thecentre of the solenoid.
5. With the aid of a well labelled diagram describe the principle, construction and mode of action of a moving coil galvanometer.

ATOMIC PHYSICS

1. What are the main two experimental observation of photoelectric effect that are againstclassical physics.
2. Monochromatic light of wavelength 4500A° is incident on sodium surface of work function 2.3eV. Determine the energy of incident photons, maximum kinetic energy of theemitted electrons and stopping potential of sodium.
3. Explain how stability of an atom is related to its binding energy.
4. Obtain binding energy of the nuclei $_{26}Fe^{56}$ and $_{83}Bi^{209}$ in units of MeV from the followingdata.
   m($_{26}Fe^{56}$)=55.934939 u.
   m($_{83}Bi^{209}$)=208.98038 u
5. . A nuclear reactor is a device in which controlled chain reaction takes place to produce heat forelectricity generation. Describe the essential parts of a nuclear reactor.