ST JOSEPH OF NAZARETH HIGH SCHOOL KAVULE-MPIGI

PHYSICS SEMINAR QUESTIONS

DUE 18-06-2017

WORK, POWER& ENERGY, MOTION

1. (a) Define the following terms
   i. Jouleii. Watt

(b). A man holds a 10kg bag at rest at aheight of 0.8m from the floor. (i). How much work does he do?(ii). He then lifts it straight up to a height of 4m from the floor. how much work does he do now?

(c).Briefly describe an experiment you would use to determine the efficiency of a water pump.(d) i). State the Principle of conservation of mechanical energy

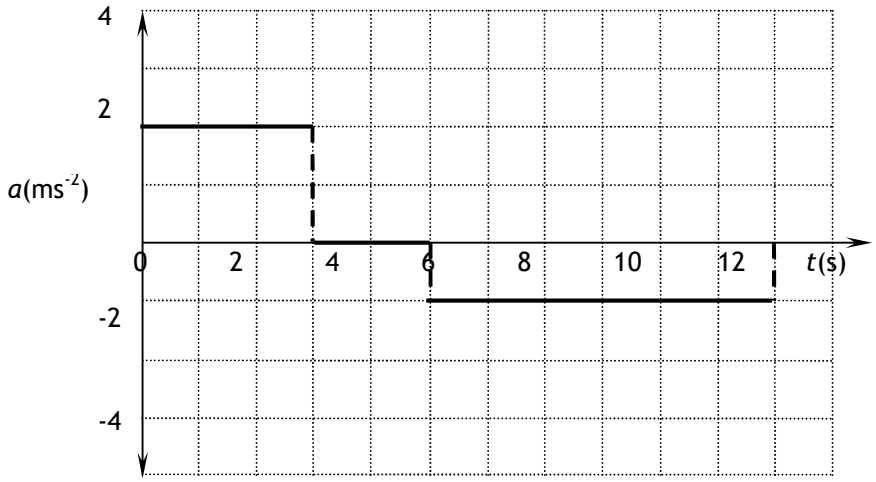
(ii). Explain why a lorry slopping on a hill takes more time to stop than a car slopping onthe same hill when the same force is applied on both vehicles.

(iii). Explain why Grace uses more energy to climb up than to run on a horizontal ground.

(iv). A girl of mass 40kg ran up a flight of 20 stairs each of 20 cm in 4 seconds. Calculate average power.

2.(a)Define the following terms. (i)Displacement (ii). Acceleration.
(iii) Uniform speed

(b)The figure below shows a graph of acceleration against time for the motion of a trolley which started from rest.(i). Usethe information to draw a sketch graph of velocity against time for the motion. (ii). Find the total distance travelled by the trolley.(iii). Describe the motion of the trolley.



(c)A stone is thrown horizontally with a velocity of $15.0ms^{-1}$ from the top of a building 20m high. How far horizontally from the bottom of the building will the stone fall?

(d)Briefly explain why a goal keeper draws hands backward when catching a football.

OPTICS

3.(a)(i). Define a beam of light. (ii). Distinguish between a real and a virtual image.(iii). An image of height 10cm is formed at a distance of 8cm from the converging lens of focal length 15cm when an object is placed perpendicularly on the principal axis of the lens and in front of it. By graphical construction, determine the height of the object and the magnification. (iv). Explain how a converging lens is used as a magnifying glass.

(b) Define the following terms;(i) Rectilinear propagation of light.
(ii) Dispersion of light. (iii) Deviation of light

(c) With the aid of a diagram, describe an experiment to produce a pure spectrum.
(d) Explain why the sun appears red at sun rise and sunset.

4.a) (i). Define Virtual image(s) with ray diagrams in plane and concave mirrors.
(ii).Explain briefly why parabolic mirrors are used in search lights.

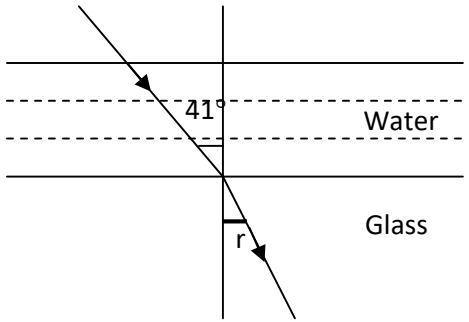
(iii).With the aid of a labeled diagram, describe a simple experiment to determine the focal length of a converging lens.

(b)(i). What is meant by accommodation.(ii) State the eye defects and their corrections

(c). (i). Distinguish with relevant diagrams between critical angle and total internal reflection.

ii) Describe briefly the formation of a mirage

(d) A ray of light is incident on a water-glass boundary at an angle of 41°. Calculate the angle of refraction r, if the refractive indices of water and glass are 1.33 and 1.50 respectively.



HEAT

5.(a) (i) Define fixed points of a thermometer.

(ii)Describe an experiment to determine the fixed points of a thermometer. (iii) Give two reasons why water is not used as a thermometric liquid.

(b)When a Celsius thermometer is inserted in a boiling liquid, the mercury thread rises above the lower fixed point by 20.5cm. Find the temperature of the boiling liquid if the fundamental interval is 30cm. (c). (i) State the law of volume and temperature of an ideal gas.

(ii) The volume of a fixed mass of a gas at a given pressure is 2.5m3 at 290K. At what temperature will the volume be 1.5m^3 at the same pressure?

6.(a) Define specific latent heat of vaporization.

(b)(i) A calorimeter of mass 35.0 g and specific heat capacity 840 J kg^{-1} k^{-1}Contains 143.0g of water 7^oC. Dry steam at 100^o C is bubbled through the water in the calorimeter until the temperature of the water rises to 29^oC. If the mass of steam which condenses is 5.6 g,find the specific latent heat of vaporization of water.
(ii) 50N on a cord is turned through 200 revolutions over a copper rod of diameter 25.0mm and mass 0.2kg using a motor. Calculate specific heat capacity of the copper rod if its temperature is raised by 10K.
(c) Explain, in terms of molecules, what is meant by a saturated vapour.

(d) Describe briefly one application of evaporation.

WAVES

7.(a) (i) Define sound.
(ii) Why does sound travel faster in solids than in gases.
(iii) Explain why an open pipe is preferred to a closed pipe when used in producing different notes. (iv) The frequency of the third harmonic in a closed pipe is 260Hz. Find the length of the air column in the pipe (speed of sound in air is 320ms^{-1})
(b) Define each of the following terms as applied to wave motion:
(i) Wave front (ii) Frequency (c) The wave length of a radio is 15m, calculate,
(i) the frequency (ii) the period of the wave

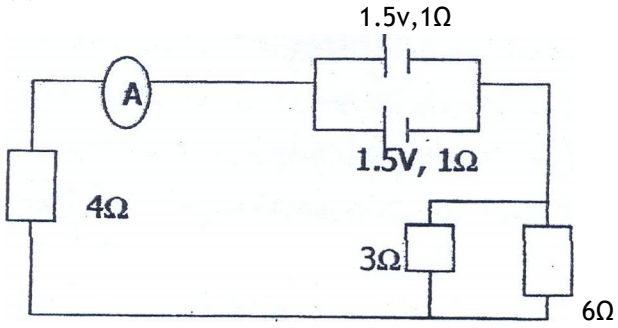
8.a). Distinguish between period and frequency of wave. How do they relate to each other?
b). Micro waves, with a frequency of 9.0 x 10^6Hz, travel from a remote control to television set. What is the wave length of the micro wave?

c). Define the following:
i) Ultrasonic sound ii) Infrasonic sound d). State two properties of sound waves.
e). A man standing midway between two cliffs makes a loud sound and hears the first echo after 3 seconds. Calculate the distance between the two cliffs if the velocity of sound in air is $330ms^{-1}$.
f). Describe an experiment to measure the speed of sound in air using the resonance method.

ELECTROSTATICS AND ELECTRICITY

9. (a). (i) State the law of electrostatics. (ii) Explain what happens to an insulator when it is rubbed by another insulator of different material. (b). (i) Define electrostatic induction. (ii) With diagrams, explain how two metal spheres can be both charged positively by induction.

(c).



The figure shows two cell of emf 1.5Vand internal resistance 1Ω each connected to a circuit of resistance, 3Ω and 6Ω.

(i) What is the reading of the ammeter A.
(ii) Calculate the power dissipated in the 4Ω resistor.

10. (a) (i) Describe the structure and action of a fluorescent tube.

(ii) Give three advantages of a fluorescent tube over a filament lamp.

b) Describe The functions of;
(i) a fuse (ii) an earth wire

(c) Describe briefly how power is transmitted from a power station to a home.
(d) Find the cost of running two 80W lamps for 20hours if the cost of each unit is shs 500.

MECHANICS(MOMENTS)

11.(a)i)Define pressure and state its unit.

(ii)Describe an experiment to show that pressure in a liquid increase with depth in the liquid.iii) State two factors on which the pressure of liquid depends.

b) Explain why cooking at a high altitude takes a long time than at a lower altitude.
c)A spring balance reads 2.24N when a metal cube of side 3.0cm is suspended in air from the spring balance.
i) Find the density of the metal.
ii) What will the spring balance read when the metal is completely submerged in a liquid of density $1200Kgm^{-3}$?

12. a) What is meant by:

(i)Velocity ratio of a machine? (ii)Pitch of a screw?

b)A screw jack with a lever arm or 40cm and a pitch 2.0cm is used to raise a heavy load.i)Find the velocity ratio of the screw jack.ii)State two practical applications of block and tackle pulley systems

c). i) State the principal of moments.ii) Describe an experiment to verify the principle of moments(d).i) State Archimedes' principle .

ii) A swimmer of weight 600N dives into water in a swimming pool and displaces 200N of water. Find the weight of the swimmer when fully under water .

MAGNETISM AND ELECTROMAGNETISM

13.(a)(i) State the domain theory of magnets.

(ii)What is magnetic saturation?

(iii) Explain what is observed when a magnet is freely suspended in air.

(b) Define the following terms;

(i) Ferromagnetic materials. (ii) Diamagnetic materials.
(iii)Neutral point

(c) With the aid of a labeled diagram, explain how an electric bell works.

(d) A moving coil galvanometer has a coil of resistance 4Ω and gives a full scale deflection when a current of 25mA passes through it. Calculate the value of the resistance required to convert into an ammeter which reads 15A at full scale deflection

14. (a) Define electromagnetic induction.

(b) (i) With the aid of a labeled a diagram, describe how a simple a.c generator works.
(ii) Sketch the variation of voltage with time from an a.c generator.
(b) (i) State the law of magnetism.
(c) (ii) Sketch the magnetic field pattern around two bar magnets whose north poles face each other.
(d) With the aid of a diagram, explain the use of magnetic keepers.
(e) A galvanometer has resistance of 5Ω and a range of 0-40mA. Find the resistance of the resistor which must be connected in parallel with the galvanometer if a maximum current of 10 A is to be measured.

MODERN PHYSICS

15. (a) (i) What is meant by Radioactivity.
(ii) Describe the composition of the $^{23}_{11}Na$ atom.

(b) Describe a simple experiment to distinguish the three radiations that are emitted by radioactive materials. (c).
(i) Define half-life of a radioactive substance.

(ii) A radioactive substance decays to $\frac{1}{16}$ of its original mass after 16days. Find the fraction of the original mass that will not decayed after 20 days.
(d) Describe how radiation on activity is used in determined the age of fossils.

16.(a).What is meant by photo-electric effect?
(b).(i) State the conditions necessary for photo-electric effect to take place?
(ii) .With aid of a labeled diagram, describe how an alternating current can be fully rectified.
(c).(i) State the function of the fluorescent screen in a cathode ray oscilloscope.
(ii)Give two applications of cathode ray oscilloscope.
d)A radioactive nuclide $^{226}_{88}X$ emits an alpha particle and turns into another nuclide Y.
i)Write a balanced equation to represent this nuclear change.
ii)How would the nuclide X be affected if a beta particle was emitted instead of an alpha particle?
iii)Compare the nature and properties of an alpha particle with those of a beta particle.

PRACTICAL PAPER 535/3

17. In an experiment to determine the focal length of a lens a student was instructed to measure distances x and y for each of the given values of s = 2.5, 5.0, 10.0, 20.0, 30.0, 40.0cm. The student attained the following values

x(cm)	24.7	23.5	21.2	16.0	10.7	5.3
y(cm)	25.7	25.2	22.4	16.9	11.2	5.5

(a). Put the student's results into a suitable table including values x, xy, x/y, (x+y), (y-x), (s+x), 1/y, $(1/y)^2$, $1/x^2$

(b). (i).Plot a graph of s against y.
(ii). Determine the intercepts C_1 on the s-axis and intercept C_2 on the y-axis.

18. In an experiment to determine acceleration due to gravity, a S.4 candidate measured distances y and time t for 20 oscillations of a pendulum bob for each of the length l . He tabulated the results as shown below, where T is the period.

l(cm)	y(cm)	t(s)	y^2	T	T^2
60.0	52.1	8.5			
65.0	54.9	10.0			
70.0	56.5	13.5			
75.0	58.2	15.0			
80.0	60.0	17.0			
85.0	61.6	19.5			

(a). Complete the table, indicating units of y^2, T, T^2

(b)(i) Plot a graph of l against T^2.
(ii) Find theslope of your graph.
(iii)Calculate the acceleration due to gravity g from g=4π2S

(c) Copy and complete the table below

$\theta(°)$	$\sin\theta$	$\frac{1}{\sin\theta}$	x(cm)	$\frac{1}{x}(cm^{-1})$	$x^2\ (cm^2)$	$\frac{1}{x^2}(cm^{-2})$	$x\cos\theta(cm)$
10			6.4				
20			6.5				
30			6.7				
40			7.0				
50			7.3				
60			7.8				

19.In an experiment to verify 0hm's law, Ntambi obtained the following values of potential difference V in volts and corresponding current I in amperes.

V(v)	1.8	1.4	1.1	0.9	0.8
I(A)	0.80	0.65	0.50	0.45	0.40

(a). Put Ntambi's results in a suitable table, including values of I^2, V^2, $\frac{V}{I}$, VI indicate units in each case.

(b)(i). Plot a graph of V against I.
(ii). Find the slope of the graph.
(iii). Read and record the intercept on the V-axis.