PHYSICS

Date: 21 /06/2022

Period: 8:30 am-11:30 am

END OF TERM III EXAMINATIONS

GRADE : **S 5**

COMBINATIONS **PCB,PCM,MPG,MPC**

DURATION: **3 HOURS**

MARKS: **..... /100**

INSTRUCTIONS

This paper is composed of two Sections **A** and **B**

Section A: Attempt all 15 questions **(60 marks)**

Section B: Attempt all 5 questions **(40 marks)**

SECTION A: ATTEMPT ALL QUESTIONS (60 MARKS)

1) a) State any one

(i) element of radio transmission **(1mark)**

(ii) element of cellular network **(1mark)**

b) What do the following terms used in communication systems mean?

(i)handoff **(1mark)**

(ii) Telegraph **(1mark)**

2) a) Define the following terms.

(i) Photoelectric effect **(1mark)**

(ii) Threshold frequency **(1mark)**

b) State any two factors affecting photoelectric effect. **(2 marks)**

3) Choose the choice that best answers the question

a) The angular momentum of hydrogen electron in n^{th} orbit is given by

(i) nh

(ii) $h/2n\pi$

(iii) $nh/2\pi$

(iv) $n^2 h/2\pi$

(1mark)

b) An electron in the hydrogen atom is in the n = 4 energy level when this electron makes a transition to a lower energy level, the wavelength of the photon emitted

(i) is in the Lyman series only,

(ii) is in the Balmer series only,

(iii) is in the Paschen series only,

(iv)Could be in the Lyman, Balmer, or the Paschen series

(1mark)

c) According to the Bohr's model of hydrogen atom, relation between the principal quantum number n and the radius r of stable orbit is

a) $r \propto n$

b) $r \propto 1/n$

c) $r \propto 1/n^2$

d) $r \propto n^2$

(1mark)

d) When electrons move from a lower energy level to a higher energy level, energy is

(i) absorbed

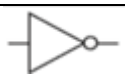
(ii) emitted

(iii) both (a) and (b)

(iv) none of the above

(1mark)

4) Match each of the elements from column A with that from column B

Column A	**Column B**
a) 	i)Books
b)Operation information	ii) AND logic gate
c)Communication information	iii) Program controlling a robot
d) 	iv)NOT logic gate

(4 marks)

5) An equation of a damped oscillation is $m\frac{dx^2}{dt^2}+b\frac{dx}{dt}+kx=0$

a) What causes a damping in oscillatory motion? **(1 mark)**

b) State the type of damped oscillation for each of the following cases

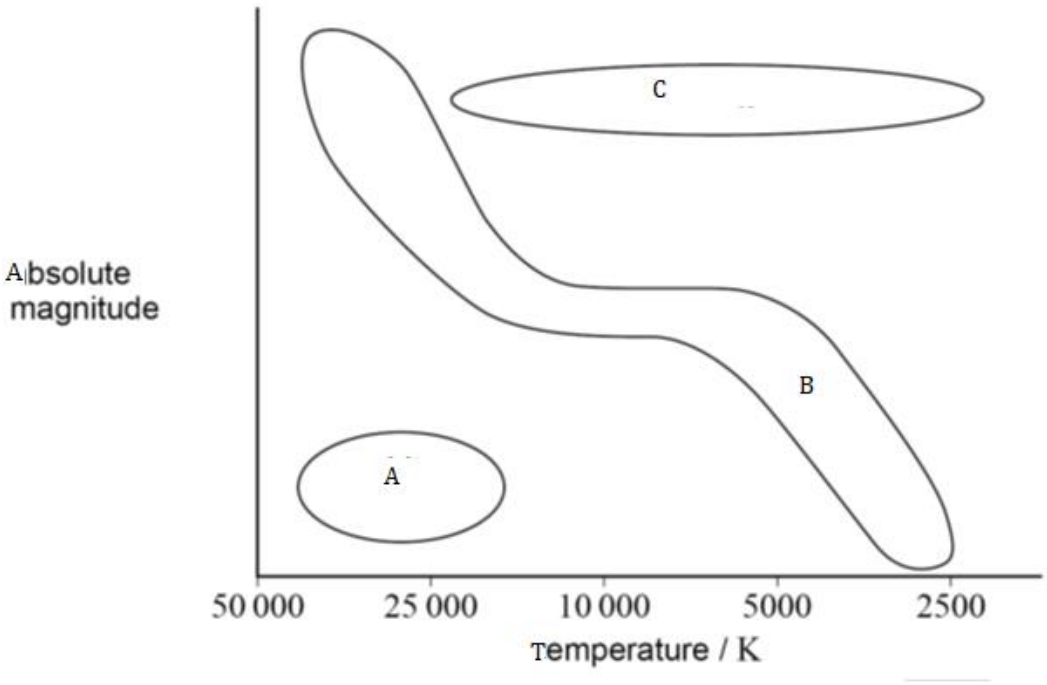
(i) The damping constant $b=\sqrt{4mk}$ **(1mark)**

(ii) $b \succ \sqrt{4mk}$ **(1mark)**

(iii) $b \prec \sqrt{4mk}$ **(1mark)**

6) a) What is a star? **(1mark)**

b) The figure below is a Hertzsprung-Russell (HR)diagram



Identify the types of stars represented by the letters A, B and C **(3 marks)**

7) a) Will there be effect in the electric potential if the medium around the electric charge is changed? Explain **(2 marks)**

b) If a positive electric charge is shifted from a low electric potential to a high electric potential, what will happen to the electric potential energy? Explain. **(2 marks)**

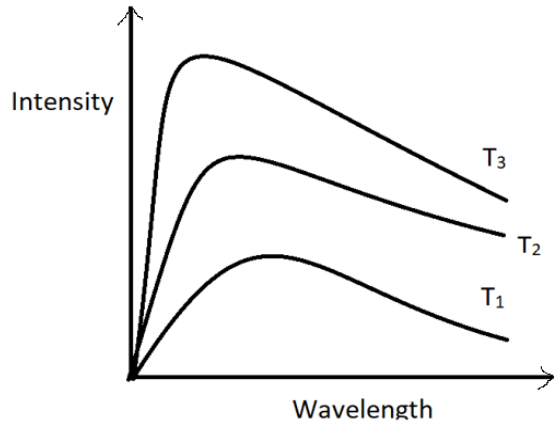
8) Describe any four important points related to the propagation of a progressive wave. **(4 marks)**

9) a) Differentiate between first cosmic velocity and second cosmic velocity **(2 marks)**

b) Does Jupiter have more or less gravity than Earth?

Explain your answer **(2 marks)**

10) Analyse the following graph of intensity of black body radiation against its wavelength for different temperatures



Answer questions related to the graph

a) What happens to the intensity of black body radiation when its wavelength decreases? Explain your answer. **(2 marks)**

c) According to the theory of black body radiation, do you emit blackbody radiation? Explain your answer **(2 marks)**

11) a) What is the de Broglie wavelength of a ball of mass 150 g moving at a speed of 50 m/s? Planck's constant h=6.626 x10^{-34} Js. **(2 marks)**

b) The laser light used in compact disc player has a wavelength of $7.8\times10^{2}\,nm$. Calculate the energy of a single photon of this light

Speed of light is 3x10^{8} m/s **(2 marks)**

12) In a double slit experiment, the distance between the slits is 3 mm and the slits are 2 m away from the screen. Two interference patterns can be seen on the screen one due to light with wavelength 480 nm, and the other due to light with wavelength 600 nm.

What is the separation on the screen the fifth order bright fringes of the two interference patterns? **(4 marks)**

13) The table below shows some properties of the four brightest stars in the constellation Canis Minor.

Name	Apparent magnitude	Absolute magnitude	Spectral class
Gamma A	4.46	-0.50	K
Gameisa	2.89	-0.70	B
HD 66141	4.39	-0.13	K
Procyon	0.34	2.65	F

a) Deduce which star Gamma A and HD 66141 has the larger diameter

Explain clearly your answer **(2 marks)**

b) Identify the most luminous star.

Use the above data to explain your answer. **(2 marks)**

14) a) Particles called π-mesons are produced by accelerator beams. If these particles travel at 2.70×10^{8} m/s and live 2.60×10^{-8}s when at rest relative to an observer, how long do they live as viewed in the laboratory? **(2 marks)**

b) What is the rest energy of an electron, given its mass is 9.11×10^{-31}kg?

Give your answer in joules. **(2 marks)**

15) The title of the unit 7 from S5 physics syllabus is electric field potential and gravitational potential.

Is gravitational field same as electric field?

Justify your answer by giving the reasons why they have been put in the same unit. **(4 marks)**

SECTION B: ATTEMPT ALL QUESTIONS (40 MARKS)

16) Use essay form to discuss the risks associated with nuclear power. **(10 marks)**

17) Do the advantages outweigh the disadvantages of using fossil fuels? Justify your answer. **(7 marks)**

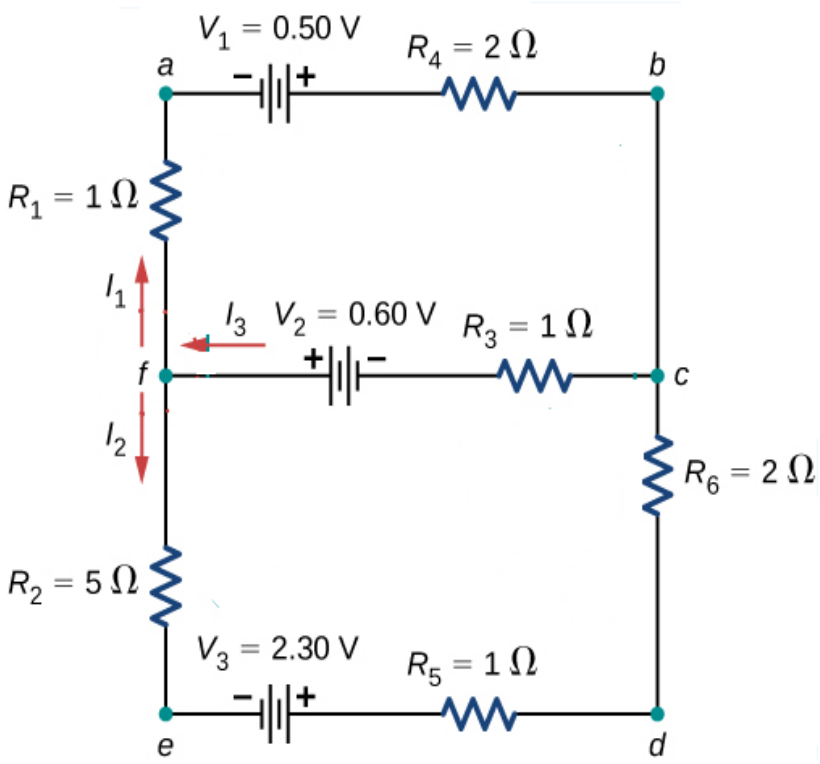
18) Most people frequently use cell phones while communicating with others. Sometimes they can be addicted.

Addiction is an inability to stop using something even though it is causing physical and psychological harm.

Propose any six signs and symptoms of cell phone addiction**. (6 marks)**

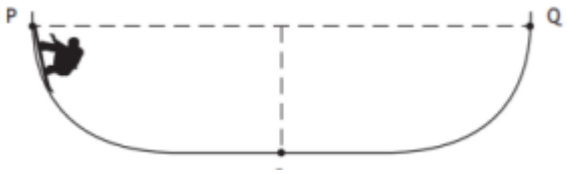
19) a) State the Kirchhoff's voltage law. **(1 mark)**

b) Analyse carefully the following electrical circuit



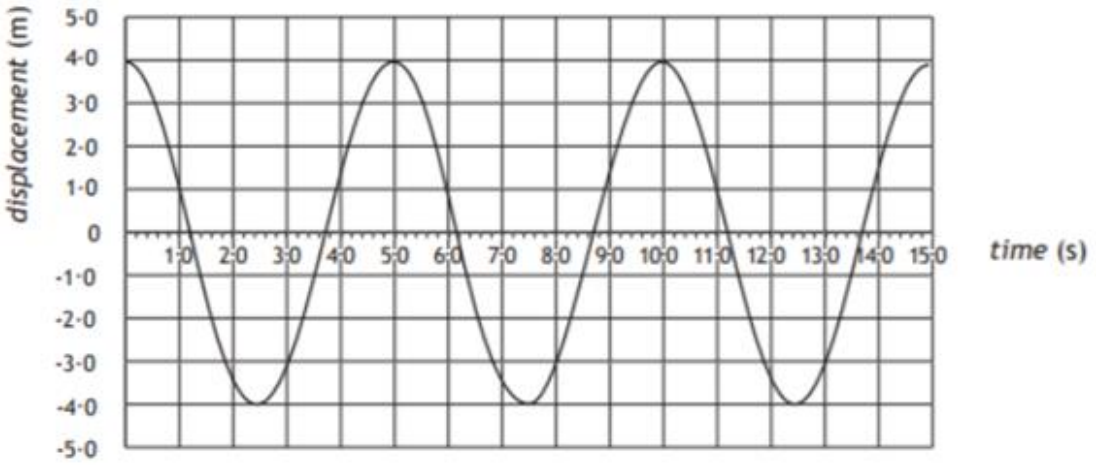
Use Kirchhoff's laws to find the electric currents flowing in the above electric circuit. **(6 marks)**

20) Figure below shows a snowboarder in half pipe .The snowboarder is moving between positions P and Q. The total mass of snowboarder and boarder and board is 85 kg.



The student attempts to model the motion of the snowboarder as simple harmonic motion.

The displacement time graph produced is shown below.



a) Prove that the motion of snowboarder is simple harmonic motion

(2 marks)

b) Determine the maximum acceleration experienced by the snowboarder on half pipe. **(2 marks)**

c) (i) Write down an expression which describes how the displacement varies with time. Numerical values are required. **(2 marks)**

(ii) Find the expression of the velocity. **(1mark)**

(iii) Sketch a velocity-time graph for one period of this motion. Numerical values are required on both axes. **(3 marks)**

End

PHYSICS PRACTICAL

Date: 29/ 06 /2022

Period: 8:30 am-11:30 am

END OF TERM III EXAMINATIONS

GRADE : **S5**

COMBINATIONS : **PCB,MPC,MPG,PCM**

DURATION: **1 H 30 MIN**

MARKS: **..... /40**

INSTRUCTIONS

This paper is composed of **ONE** compulsory question

Non programmable calculator and mathematical instruments

may be used.

Use only a blue or black pen

Use pencil for drawing.

The diagram drawn on one white sheet of paper will be marked

ATTEMPT ALL SUB QUESTIONS (40 MARKS)

In this experiment, you will determine angle of the glass prism provided.

Apparatus required:

1 equilateral glass prism

1 soft board

4 optical pins

4 drawing pins

1 protractor

1 plane white sheet of paper A4

1 pencil with rubber

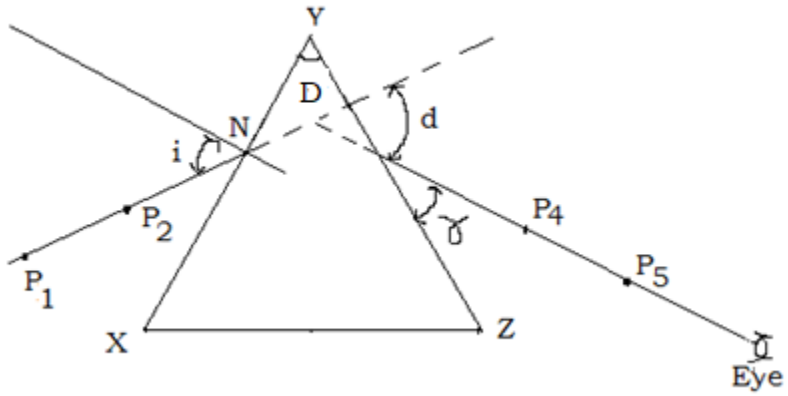
1 razor blade to sharpen pencil or 1 pencil sharpener

1 ruler 30 cm long or 15 cm long

a) Fix the plane white sheet of paper on a soft board using 4 drawing pins provided.

b) Place the glass prism on a sheet of white paper with the triangular face on the paper and tracing round its edges marking angle B on your answer sheet and measure it . **(1mark)**

c) Mark the corners XYZ of the prism as shown in the diagram below after tracing its outline using a sharp pencil. Remove the prism.



d) Mark the point N, 2 cm from the vertex Y of the prism. Draw the normal line through N.

e) Draw a line making an angle $i = 30.0°$ as shown not to scale in the diagram above and produce it with a dotted line.

f) Fix two pins p_1 and p_2 vertically upright on this line you have drawn in (e) above.

g) Replace the prism on the sheet of paper such that its surfaces and vertices coincide exactly with that you have drawn in (c).

h) From the face YZ of the prism, view the images of pins p_1 and p_2.

i) While viewing, fix pins p_3 and p_4 such that they are in line with the images of pins p_1 and p_2.

j) Remove the pins and the prism.

k) Draw a line passing through the marks of pins p_3 and p_4 to meet the surface YZ. Produce this line with dots to meet the line passing

through p_1 and p_2 (see the given diagram).

l) Measure and record the angles d and γ with one decimal place.

m) Repeat the procedures (e) to (l) for the angles of incidence

$i = 40.0°, 50.0°, 60.0°, 70.0°$ and $80.0°$.

n) Record your results in a suitable table including

$i, d, \gamma, \beta = 90 - \gamma, \delta = d - \beta$.

(23 marks)

o) Plot a graph of δ (along y- axis) against incidence angle i

(along x- axis).Draw a best fit straight line . **(7 marks)**

p) Read and record the intercept A on the i-axis **(1 mark)**

q) Compare A and D and conclude **(2marks)**

u) Hand in (submit) the unique sheet of paper used during this experiment

(6 marks)

End.

END OF TERM III EXAMINATIONS 2021/2022

S5 PHYSICS

MARKING SCHEME

SECTION A

1) a) (i) Transducer **(1mark)**, transmitter, Receiver

(ii)Base transceiver station **(1mark)** base station controller, mobile switching centre.

b) (i)A handover or handoff refers to the process of transferring an active call or data session from one cell in a cellular network to another or from one channel in a cell to another. **(1 mark)**

(ii)A telegraph is a system or process for transmitting messages or signals to a distant place, especially by means of an electric device consisting essentially of a sending instrument and a distant receiving instrument connected by a conducting wire or other communications channel **(1 mark)**

2)a) (i)The photoelectric effect is the emission of electrons from the surface of a metal when electromagnetic radiation with sufficient energy (such as visible or ultraviolet light) strikes on that metal. **(1mark)**

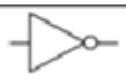
(ii)Threshold frequency is defined as the minimum frequency that is required for the radiation such that photoelectric effect is produced **(1mark)**

b) Frequency of light**(1mark),** intensity of light **(1mark),** nature of material

3)a)(iii) $nh/2\pi$ **(1mark)** b) (iv) Could be in the Lyman, Balmer, or the Paschen series **(1mark)**c) $r \propto \eta^2$ **(1mark)**d) (i) absorbed **(1mark)**

4) a)—iv) **(1mark)** b)----iii) **(1mark)** c)----i)**(1mark)** d) ----iii)**(1 mark)**

Or

Column A	**Column B**
a) 	i)Books
b)Operation information	ii) AND logic gate
c)Communication information	iii) Program controlling a robot
d) 	iv)NOT logic gate

5) a) Friction force **(1mark)** air resistance, viscous force

b) (i) $b = \sqrt{4mk}$ critically damped oscillation**(1mark)**

(ii) $b \succ \sqrt{4mk}$ Over damped oscillation **(1mark)**

(iii) $b \prec \sqrt{4mk}$ under damped oscillation **(1mark)**

6) a**)** A star is any massive self-luminous celestial body of gas that shines by radiation derived from its internal energy sources. **(1 mark)**

b**)** A: White dwarf star **(1mark)** B: Main sequence star **(1mark)**

C: Giant star**(1mark)**

7)a) Yes**(1mark**), medium affects the potential around the charge.

The electric potential due to a charge $V = \frac{1}{4\pi\varepsilon} x \frac{Q}{r}$

With increase in dielectric constant $\varepsilon = \mathcal{E}_0 \mathcal{E}_r$ of the medium the potential around the charge goes on decreasing

(1mark) Or the electric potential increases when ε decreases

b) The electric potential energy of the charge increases(**1mark).**

The electric potential of the charge for a lower potential V_1

is PE=QV_1, the potential energy for high potential V_2 is PE'=QV_2.

It is clear that PE' is greater than PE because V_2 is greater than V_1**(1mark)**

8) Description of the characteristics of a progressive wave

- During the propagation of waves, energy is transferred along with the waves, there is no transfer of matter **(1mark).**
- The particles attain the maximum velocity when they pass through their mean position **(1mark).**
- All vibrating particles of the medium have the same amplitude, period and frequency but the phase (state of vibration of a particle) changes from one particle to another**(1mark)**
- The wave propagates through the medium with a certain velocity. This velocity depends upon the properties of the medium**(1mark)**
- No particle of the medium remains permanently art rest. Each particle comes to rest momentarily while at the extreme positions of vibration.
- In a transverse wave, the vibrations of the particles are perpendicular to the direction of propagation of the wave and produce crests and troughs in their medium of travel.
- In longitudinal wave, the vibrations of the particles produce compressions and rarefactions along the direction of the propagation of the wave.

9)a) First cosmic velocity

The first cosmic velocity is known as the orbital velocity, which is the least velocity of a projectile to keep the orbit around a celestial body**. (1mark)**

The first cosmic velocity can be calculated by using the gravitational force and the centripetal force of the satellite $\frac{mv^2}{R_e} = \frac{GMm}{R^2} \Rightarrow v = \sqrt{\frac{GM_e}{R_e}}$ after substitution,

$v = 7900 m/s$ (Data related to Earth)

Satellite must have extremely high velocity to orbit around the earth. In fact, satellites go around the earth at the height h=160km in order not to break into the atmosphere.

Second cosmic velocity (escape velocity)

The second cosmic velocity is known as the escape velocity. This is the velocity that escapes from the gravitational field of a celestial body. (**1mark)**

It is the speed needed to break free from the gravitational attraction of the Earth.

Its value is calculated as $\frac{1}{2}mv_2^2 = \frac{GM_e m}{R_e}$, after substitution $v_2 = 11200 m/s$ or $\sqrt{2} \times v_1$

b) The gravity on Jupiter is greater than the gravity on the Earth **(1mark)** because Jupiter is more massive **(1mark)** Acceleration due to gravity **g**=G M_{planet}/R^2

10) a) Intensity of the radiation increases **(1mark)**

The relation between energy of a radiation and wavelength is

$E = hC/\lambda$ if λ decreases, E increases **(1mark)** and radiation is defined as emission of energy through space at a speed of light in vacuum

b) Yes**(1mark).** The wavelength of radiation emitted depends on the temperature of the objects and all bodies at a temperature above 0K radiate electromagnetic radiation according to Stefan-Boltzmann law and Wien's displacement law**(1mark).**

11) a)Given: m = 150 g; v = 50 m/s

The required equation λ=h/p=h/mv**(1mark)**

$\lambda=(6.626 \times 10^{-34} / 150 \times 10^{-3} \times 50)$

$\lambda=8.83 \times 10^{-35}$ m**(1mark)**

b) The energy of re single photon

$E = hC/\lambda$

(1mark)

$$E = \frac{hc}{\lambda} = \frac{6.63\times10^{-34}\times3\times10^{8}}{7.8\times10^{2}\times10^{-9}} = 2.55\times10^{-19}\,J$$ **(1mark)**

12) The position of the bright fringe $Y = n\frac{\lambda D}{d}$ **(1mark)**

$$y_1 = 5x\frac{480x10^{-9}x2}{3x10^{-3}}m = 1.6\text{x}10^{-3}\,\text{m}$$ **(1mark)**

$$y_2 = 5x\frac{600x10^{-9}x2}{3x10^{-3}}m = 2\ \text{x}10^{-3}\,\text{m}$$ **(1mark)**

$Y_2 - Y_1 = 2\times10^{-3}\ \text{m} - 1.6\times10^{-3}\ \text{m}$

$= 4\times10^{-4}\text{m}$ **(1mark)**

Therefore, the separation on the screen between the fifth order bright fringes of the two interference patterns is 4×10^{-4}m

13) a) Same spectral class so same temperature

Absolute magnitude of Gamma A is more negative thus it is brighter than HD66141 **(1mark)** or it has greater power output than HD 66 141)

Due to Stefan-Boltzmann's law, Gamma has a larger area therefore larger diameter **(1mark)**

b) Gameisa **(1mark)** It has low absolute magnitude **(1mark)**

A star with absolute magnitude -6 is intrinsically more luminous than a star with magnitude +4

14) a) They live a time $t' = \frac{t}{\sqrt{1-\frac{v^2}{c^2}}}$ **(1mark)**

$$t' = \frac{2.60x10^{-8}}{\sqrt{1-\frac{(2.70x10^{8})^{2}}{(3x10^{8})^{2}}}}\, s = 5.96x10^{-8}\, s$$ **(1mark)**

b) Rest energy of an electron $E=mc^2$ **(1mark)**

$=9.11\times10^{-31}\ x(3x10^{8})^2\ J=81.99\ x10^{-15}J$**(1mark)**

15) They are different because electric field is a region around a charged particle or object within which an electric force would be exerted on other charged particles or objects **(1mark).**

The gravitational field at any point P in space is defined as the gravitational force felt by a tiny unit mass placed at P.**(1mark)**

They are in one unit because they have similarities

Any two similarities

Both gravitational and electric field obey inverse square laws. **(1mark)**.

They both act between two bodies without contact **(1mark).**

Mass/charge in a gravitational field/electric field has potential energy.

They act in vacuum

Gravitational force and electric force are conservative

SECTION B

16. Introduction (**1mark)**

Even if in nowadays, nuclear plant are ones appreciated due to their high production, but they cause many problems, so that in the following, we are describing some risks associated with them.

Body

some risks associated with nuclear power are described below

Climate change, air and water pollutions (1mark)

If an accident occurs, nuclear energy can explode**.** This can cause air pollution, water pollution and the delayed radioactive fallout, which gradually fall over months and even years to the ground, often in rain.

They produce changes in the climate (possibly by lowering of the earth's temperature over the whole hemisphere which could ruin agricultural crops and cause widespread famine). Nuclear power plants use uranium as fuel. The process of mining uranium releases high amounts of carbon dioxide into the environment. Carbon dioxide is also released into the environment when new nuclear power plants are built. Finally, the transport of radioactive waste also causes carbon dioxide emissions which is greenhouse gas. **(1mark)**

Destruction of ozone layer (1mark)

The massive columns of smoke generated by a nuclear war would alter the world's climate for years and devastate the ozone layer engendering both human health and food supplies. They would cause partial destruction of the **ozone layer**, which protects the earth from the sun's ultraviolent rays. If ozone layer is depleted, unprotected people would suffer a type of snow blindness from the rays which, if repeated, would lead to permanent blindness. Many animals would suffer the same fate **(1mark)**

Nuclear meltdown (1mark)

A nuclear meltdown occurs when a nuclear power plant system or component fails so the reactor core becomes overheated and melts. A meltdown releases the core's highly radioactive and toxic elements into the atmosphere and environment. **(1mark)**

Weapons Proliferation Risk (1 mark)

The growth of nuclear energy has historically increased the ability of nations to obtain or harvest plutonium or enrich uranium to manufacture nuclear weapons. The nuclear weapons proliferation concern is a barrier and risk to the increasing development of nuclear energy. Radioactive dust from the

detonating bombs rises up into the atmosphere and spreads out over large areas of the world from where it falls down and causes deadly levels of radiation. A nuclear weapon could cause great destruction, death, and injuries such as burns, blindness and radiation sickness. **(1mark)**

Nuclear energy produces radioactive waste

A major environmental concern related to nuclear power is the creation of radioactive wastes such as uranium mill tailings, spent (used) reactor fuel, and other radioactive wastes. These materials can remain radioactive and dangerous to human health for thousands of years.

Conclusion

Nuclear energies are more efficient than other forms of energy sources existing in the world. During operation nuclear power plants produce almost no greenhouse gas emissions except during the mining of uranium. But it can cause other many strong bad risks relatively to others, the reason why when its used or exploited, a considerable pay attention must be taken, to reduce dangers that may arise. **(1 mark)**

17) The pros of fossil fuels still outweigh the risks today **(1mark)**. Even though there is much discussion of renewable energy it is the old tried and true coal, oil and natural gas that power our homes and businesses today.

Perhaps the biggest advantage of fossil fuels is how easy they are to use **(1mark).** Oil and coal are easily transported to a power plant where they can be quickly turned into electricity energy**(1mark).**

Fossil fuels are not difficult to locate**(1mark).** Past studies have shown us the areas of the globe where oil reserves are located, areas where coal veins run deep under mountainous terrain and where we can most easily tap into natural gas. **(1mark)**

Easy transportation (pipelines/ tankers**) (1mark)** There is a huge transport network in place to move oil and gas from one part of the world to another.

Huge oil tankers cross the oceans and pipelines cut through countries and states with oil and natural gas flowing through them**. (1mark)**

Years of utilizing fossil fuels as an energy source has provided us with efficient power plants adding to the electrical grids across the nation and to ships, trucks and trains as part of a massive transport system.

Power plants are not limited to being built where the fossil fuels are mined or drilled. Renewable energy such as solar power and wind energy can only have plants built near the region where the energy is being captured.

You can't pump sunlight or wind through a pipeline or load it into a truck or train car. Production of solar and wind energy requires locating power plants close to the wind turbines or solar panels used to capture renewable energy resources.

Those limitations don't exist for fossil fuels. Plants can be anywhere and located near any town. Weather is not a limiting factor nor is the number of days of sunlight a year or the average wind speed. As long as large quantities of fossil fuels can be delivered, a power plant can be located almost anywhere.

There are pros of fossil fuels when you look at natural gas. Natural gas burns much cleaner than coal or oil because it is highly combustible and produces few by-products when burned. The stores of natural gas have not been used at the same pace as coal and oil.

Gas is relatively inexpensive and clean burning and does not leave soot and particulates behind. Natural gas also produces 70% less carbon dioxide when burned which makes it preferable to coal and oil.

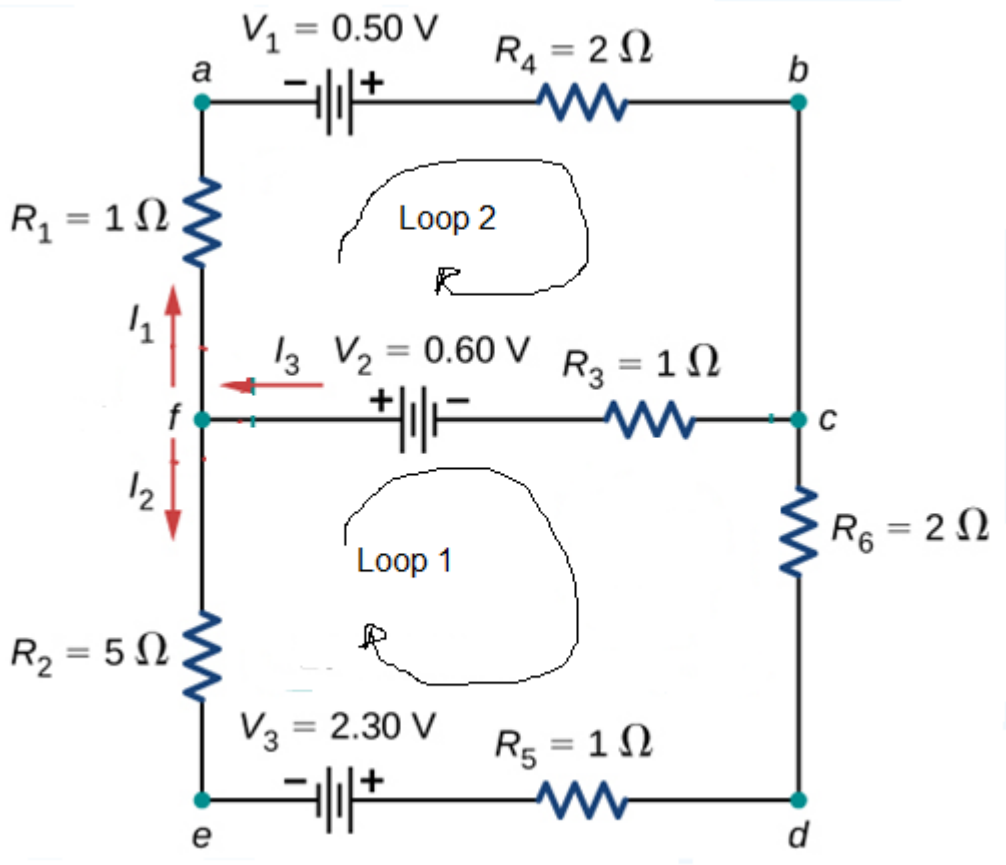
18)

- Conscious use of phones in dangerous situations or in prohibited contexts (e.g while driving) **(1mark)**

- Excessive phone use that causes social and family conflicts and confrontations, as well as loss of interest in other shared activities**(1mark)**
- Continuing the behaviour despite the negative effects and/or personal malaise it causes**(1mark)**
- Excessive phone use causing noticeable physical, mental, social, work, or family disturbances (e.g eye strain, symptoms of withdrawal, stress, and anxiety) **(1mark)**
- Frequent and constant checking of phone in very brief periods of time causing insomnia and sleep disturbances**(1mark)**
- Increase in use to achieve satisfaction or relaxation or to counteract a dysphoric mood**(1mark)**
- Excessive use, urgency, need to be connected
- Need to respond immediately to messages, preferring the cell phone to personal contact
- Abstinence, dependence, craving
- Anxiety, irritability if cell phone is not accessible, feelings of unease when unable to use it
- Chronic impulsiveness to check the device**.**
- Back and Neck Problem: This is a common problem that all phone addicts deal with. Most people arched down when they used their phones. Looking down at the mobile phone for an extended period causes them to have back and neck pain issues.
- Need for newest cell phone, more applications, or increased use.

19) a) Kirchhoff's voltage law states that in any complete loop within a circuit, the sum of all voltages across components which supply electrical energy (such as cells or generators) must equal the sum of all voltages across the other components in the same loop**(1mark).** This law is a consequence of both charge conservation and the conservation of energy.

b) Subdivide the electric circuit into loops



Junction f : $I_3=I_1+I_2$ **(1mark)**

Loop 1:fcdef $-0.60 +I_3+8I_2-2.30=0$

$2.90= 8I_2+I_3$

$2.90=8I_2+I_1+I_2$

$2.90 =I_1+9I_2$ **(1mark)** eq 1

Loop 2 abcfa: $-0.5 -2I_1-1I_3-0.6-1I_1=0\{\}$

$1.10=3I_1+1I_3$

$1.10=3I_1+1I_1 +1I_2$

$1.10=4I_1 +1I_2$ **(1 mark)** eq2

Two equations with two unknown currents

Multiply eq 2 by -9 we obtain $-9.90=- 36I_1 -9I_2$ eq 3

Add eq 1 and eq 3 : -7.00=-35 I1

I_1 =0.2 A **(1mark)**

Put the value of I1 into eq 2 we obtain I_2=0.3 A **(1mark)**

I_3 =0.2A +0.3 A=0.5 A**(1mark)**

20) a) The motion is periodic **(1mark)**

Amplitude is constant **(1mark)**

The motion is represented by a single harmonic function of sine or cosine.

The motion is repetitive motion back and forth.

b) Amplitude A=4 m

Period T= 5 s

Maximum acceleration $a=\omega^2A$ **(1mark)**

$= (2\pi/5)^2 \times 4\ m/s^2=6.31\ m/s^2$**(1mark)**

c) The displacement Y=A cos ωt **(1mark)** because at t=0 Y=A

Y=5cos(2π/5) t in m **(1mark)**

$$v = \frac{dY}{dt}$$

$$v = -4x\frac{2\pi}{5}\sin\frac{2\pi}{5}t = -5\sin\frac{2\pi}{5}t$$ **(1mark)**

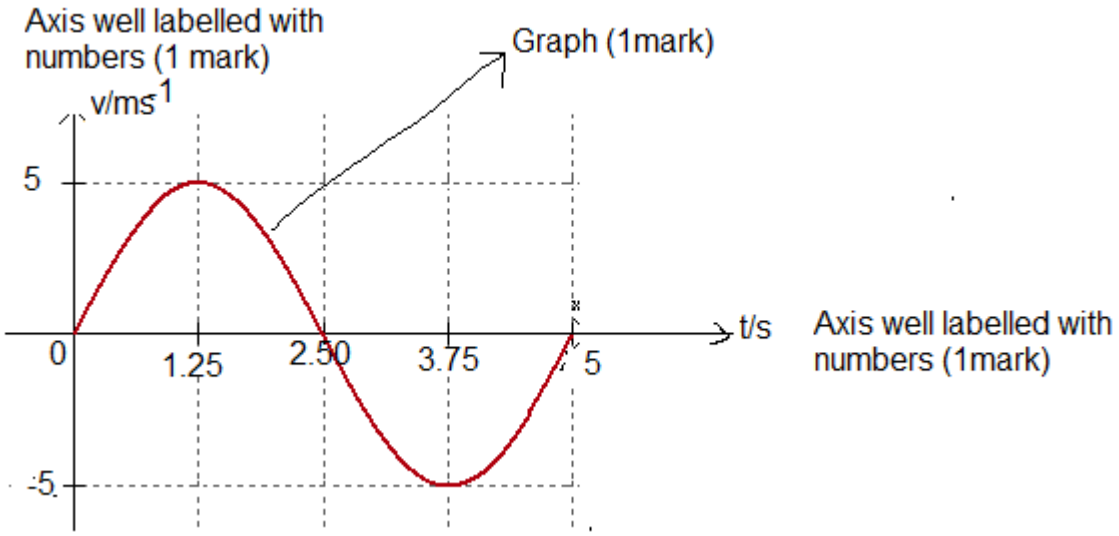
Or Y=Asin(ωt+θ)

Initial condition gives Y=A at t =0, then sinθ=1

Θ= π/2

Y=Asin(ωt+π/2) = Acosωt

t/s	0	5/4=1.25	5/2=2.50	3x5/4=3.75	5
v/ms^{-1}	0	-5	0	5	0



END OF TERM III EXAMINATIONS 2021/2022

S5 PHYSICS PRACTICAL EXAM

MARKING SCHEME (40 MARKS)

After exam, S5 Physics teacher will carry out the experiment

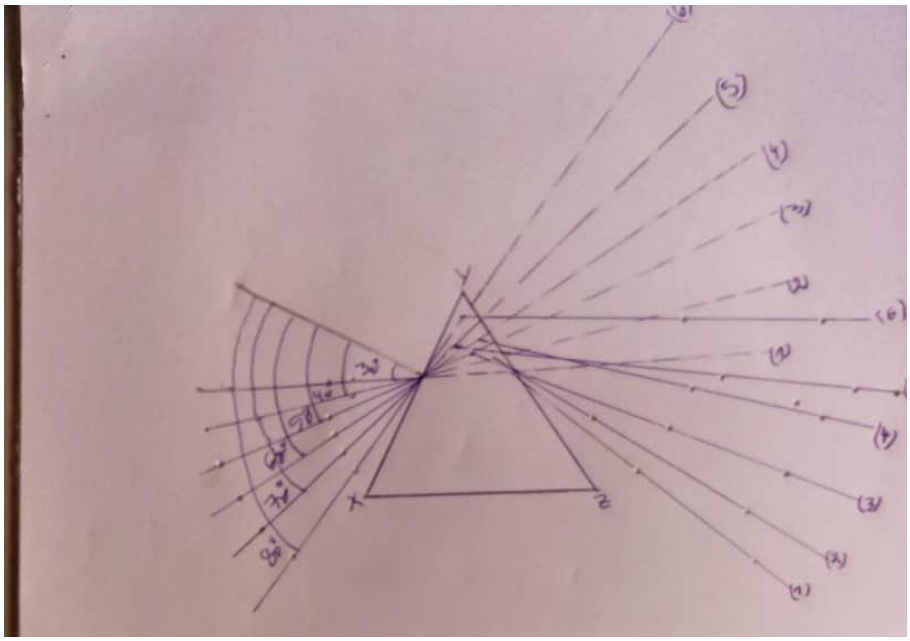
The results obtained may be used as marking scheme of S5 physics practical exam

The following marking scheme is a guide

Procedure (b) D=59.5° **(1mark)**

The procedures from (a) to (m) are summarized on the sheet of paper submitted according to the procedure (u) see the following diagram.

6 rays of light :1 markx6= 6 marks

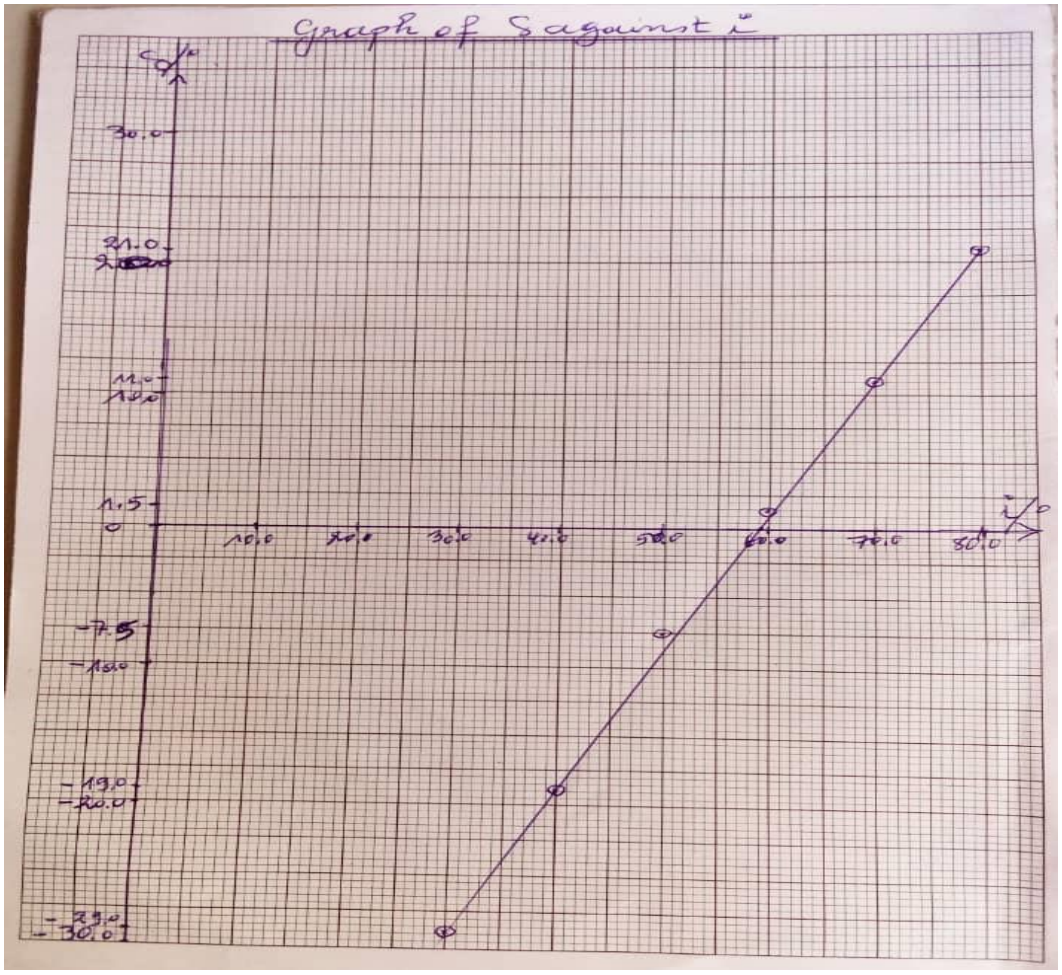


Procedure (n) Table of results

i/° **(1mark)**	d/°**(1mark)**	γ/°**(1mark)**	β=90-γ/°**(1mark)**	δ=d-β/°**(1mark)**
30.0	43.0**(1mark)**	18.0**(1mark)**	72.0**(0.5marks)**	-29.0**(0.5marks)**
40.0	46.0**(1mark)**	25.0**(1mark)**	65.0**(0.5marks)**	-19**(0.5marks)**
50.0	46.5**(1mark)**	36.0**(1mark)**	54.0**(0.5marks)**	-7.5**(0.5marks)**
60.0	47.0**(1mark)**	44.5**(1mark)**	45.5**(0.5marks)**	1.5**(0.5marks)**
70.0	50.0**(1mark)**	51.0**(1mark)**	39.0**(0.5marks)**	11.0**(0.5marks)**
80.0	55.0**(1mark)**	56.0**(1mark)**	34.0**(0.5marks)**	21.0**(0.5marks)**

Procedure (o)

Title of the graph : Graph of δ against i **(1mark)**



Labelled axes with arrows: **0.5marks x 2 =1mark**

Uniform scale**: 0.5 marks x2=1mark**

Plotted points**: 0.5 marksx6 =3marks**

Best fit straight line: **(1mark)**

Procedure (p) the value of A= 59.0° **(1mark)**

Procedure q) they are almost the same **(1mark)** because the maximum error is 0.5 ° when we use protractor whose small division is 1°

This shows that the experiment was carried out with minimized errors**(1mark)**

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