GASABO DISTRICT

S2 PHYSICS MARKING GUIDE OF END 2nd TERM EXAMINATION

SECTION A (Attempt all Questions /55marks)

1. a) i) True **(0.5 marks)**

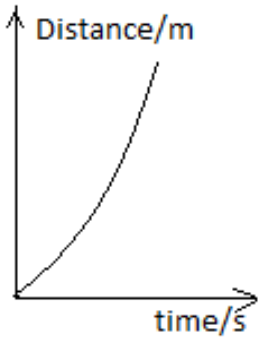
   ii) True **(0.5 marks)**

   iii) False (**0.5 marks)**

   iv) False (**0.5 marks)**

   v) False **(0.5 marks)**

b) Compare The characteristics of uniform rectilinear motion (URM) and uniformly accelerated rectilinear motion (UARM) by completing the table below. **(3marks)**

Parameters	**Characteristics**	
	URM	UARM
Acceleration	a=0m/s^2 **(0.5 marks)**	a=is constant and positive (**0.5marks)**
Initial and final velocities	U=V (**0.5marks)**	V>U (**0.5 marks)**
The distance-time graph	 (**0.5 marks)**	 (**0.5 marks)**

2. a) When a man jumps off (**action force**) shore from a boat his forward force, exerts a backward force (**reaction**)on the boat. The boat moves backwards dragging with his legs and then person tends to fall into the water**.** (**2 marks)**

b) is Newton's third law of motion (**1mark)**

c) newton's third law of motions states that "for every action force there is equal and opposite reaction force". (**1mark)**

3. a) A woman kicks forward when the bus stops abruptly in trying to resist stopping due to inertia. she wants to keep its state of motion. **(1mark)**

b) is Newton's first 1st law of motion. **(1mark)**

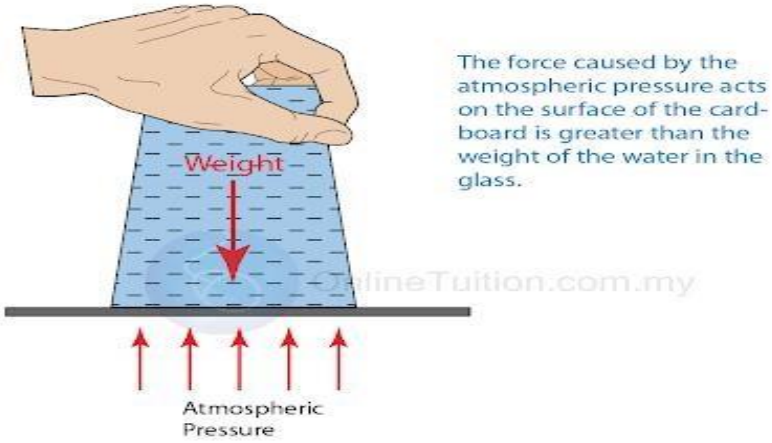
C) New first law of motion states that a body remains in its state of rest or uniform motion on straight line when there is no external force acted up on it. **(1mark)**

4a) applications of atmospheric pressure.

-Drinking using straw: by using suck force by removing air inside the straw, and External air pressure becomes greater then forced liquid to rise into the mouth. **(1mark)**

- using syringe. By pushing piston, the air pressure inside barrel will be removed and by pulling piston liquid will rise into barrel due to the lower air pressure inside **(1mark)**

b) The force due to atmospheric pressure presses the paper card against the glass mouth the water cannot pour out. **(2marks)**



c) At a high mountain, there is a low atmospheric pressure which cannot balance with the internal blood pressure. The high blood pressure pushes the blood through the nose causing some people to blood through their noses.

Alternative: at the higher mountain (higher altitude) the atmospheric pressure decreases, pressure of blood inside the body increases compared to external atmospheric pressure then cause the person to bleed through his/her nose. **(2 marks)**

d) - Bicycle pumps **(1mark)**

-Syringe injection **(1mark)**

-The lift pump

e) h= 2.5 km = 2500 m , h=d= 1.25 kg/m^3 , 10 N/kg

P= ρ x g x h = 1.25 x 10 x 2500 = 31250Pa (2 marks)

5. a) -renewable energy sources: are energy sources that are replenished (used again)

-Non -renewable energy sources: are energy sources that are not replenished (not used again) **(2marks)**

b) -Give two examples of renewable: - Hydroelectric energy, Wind energy, Solar energy

Give two examples of non-renewable: petroleum oil, natural gas etc… **(2marks)**

6.a) Coulomb's law

It states that the electric force F between two stationary charged particles q_1 and q_2 is proportional to the product of the charges q_1 and q_2 and is inversely proportional to the square of the separation r between the particles and directed along the line joining them. **(1marks)**

$$F_{st} = \frac{kQ_1Q_1}{d^2}$$

b)

$$F_{12} = \frac{kQ_1Q_1}{d^2} = \frac{9.0x10^9x6x10^{-6}x3x10^{-6}}{2^2} = 4.05x\ 10^{-2}\text{N or } 0.0405\text{N (1marks)}$$

$$F_{23} = \frac{kQ_1Q_1}{d^2} = \frac{9.0x10^9x3x10^{-6}x9x10^{-6}}{2^2} = 6.075x\ 10^{-2}\text{N or } 0.06075\text{N (1marks)}$$

$$F_2 = F_{12} + F_{23} = 4.05x\ 10^{-2}\text{N} + 6.075x\ 10^{-2}\text{N} = 1.0125x\ 10^{-1}\text{N or } 0.10125\text{N (1marks)}$$

7. a)

i) Temperature of a body is the degree of hotness or coldness of the body**.** instrument used to measure the temperature **is the thermometers (1mark)**

heat is form of energy resulting from the change of temperature.

Heat flows from hot objects (more energy) to cold objects (less energy). **Calorimeter is** an instrument or an isolated system used to measure the quantity of heat exchanged. **(1mark)**

ii)

Specific heat capacity	**Heat capacity**
The specific heat capacity of a material is the energy needed to raise one unit mass of that material of one degree Celsius and it is constant for a given substance. **(1mark)**	Heat capacity of material is the amount of heat energy needed for a substance's temperature to raise by one Celsius and depends on the mass of the substance. **(1mark)**
It unit is J/kg ^oC	Its unit is J/kg or J/kg
C=$\frac{Q}{m\Delta T}$	**Ca=**$\frac{Q}{\Delta T}$

b)

i) Vacuum **(1mark)**

ii) Vacuum is lack of atoms without atoms you examinate conduction and convection of heat. **(1mark)**

iii) walls with silvered surface (Silvered inner surfaces.) **(1mark)**
iv) It reflects the radiation(infrared) towards the liquid. **(1mark)**

8)

a) Water is used to cool radiators of engines because it has a high specific heat capacity. **(1 mark)**

b) A black body absorbs more heat than a shiny body because in general, a black object absorbs all wavelengths of light and reflects none while a shiny body tends to reflect all wavelengths of light and therefore, absorbs significantly less heat energy. **(1 mark)**

c) i) is portion: **BC (0.5marks)**

ii) m= 0.5 kg , T_1= 25 ^{O}C T_2=0 ^{O}C C= 4200J/kg^{o}C

Q= mc ΔT= 0.5x4200x (0-25) = -52500J.

Amount of heat to be removed is 52500J **(2marks)**

Negative sign means that the heat has been removed

iii) Amount heat required during fusion Q=mL_f

=0.500kgx334400J/kg=167200 J

Amount of energy to be supplied is positive **(2marks)**

9. a) **The first law of thermodynamics** states that the heat energy supplied to a system is equal to the sum of the change in internal energy of the system and the work done by the system.

Heat added = increase in internal energy + external done by the system $\boldsymbol{\Delta Q=\Delta U+\Delta W}$ **(1mark)**

b) (a) refrigerator (heat pump) **(0.5marks)** **(b)** heat engine **(0.5 marks)**

c) A heat pump is a device that removes heat from a cold body and transfers it to a hot body**.** **(0.5 marks)**

A heat engine is a device that transforms thermal energy into mechanical energy.

(0.5 marks)

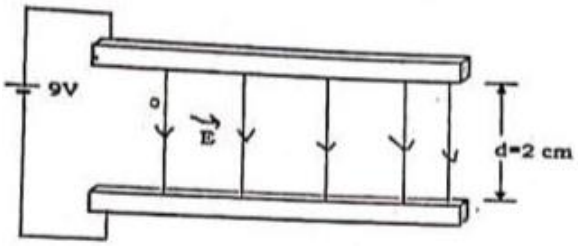
d) State the use of each

The heat pump can also provide cooling by transferring warm indoor air to the outside. The use of refrigerator is **to keep food cold**. Cold temperatures help food stay fresh longer.

(0.5 marks)

Heat engine: A heat engine is a device used **to extract heat from a source and then convert it into mechanical work**. Heat engine are use in **vehicles, boats, ships, airplanes, and trains**. **(0.5 marks)**

10. **a)**



(1mark)

b) Is uniform because Electric field lines of force are parallel (**1mark)**

C**)** magnitude of the electric field E= $\frac{V}{d} = \frac{9}{2x10^{-2}m} = 450V/m$ (**1mark**)

11. **(a)** a circuit breaker: *basic function is* ***to interrupt current flow after protective relays detect a fault.*** **(1mark)**

b) V=240V, P=750W, P= IV, 750=240I, **I=3.125A**

so A Fuse with a 3A ratio is not suitable **(2marks)**

SECTION B (choose and Attempt only three questions /30marks)

12. a) Step up transformer (**1mark)**
Step down transformer (**1mark)**

b) $V_P = 240V$, $N_P = 200$ $N_S = 4000$ $I_S = 0.2A$

i) V_S =? $\frac{V_S}{V_P} = \frac{N_S}{N_P} = \frac{V_S}{240} = \frac{4000}{200} = V_S = \frac{4000x240}{200}$, $\boldsymbol{V_S = 4800V}$ (**2marks)**

ii) $\frac{V_S}{V_P} = \frac{I_P}{I_S} = \frac{4800}{240} = \frac{I_P}{0.2}$, $I_P = \frac{4800X0.2}{240}$, $\boldsymbol{I_P = 4A}$ (**2marks)**

iii) $P_{input} = I_P V_P = 240x4 = 960W$ **(1mark)**

iv) $P_{output} = I_s V_s = 4800x0.2 = 960W$ **(1mark)**

v) η=$\frac{P_{output}}{P_{input}} x100 = 100\%$ **(1mark)**

vi) since the efficiency of this transformer is 100%, it means that this transformer does not consume any power is also called Ideal transformer **(1mark)**

13.a) **elastic collision:** are collision by which total mechanical and momentum are conserved before and after the collision. While **(1mark)**

inelastic collision: are collision by which total mechanical and momentum are conserved before and after the collision. **(1mark)**

b) before collision **After collision**

m_1=5kg $u_1 = 10m/s$ V_1=7.0m/s

m_2=10kg u_2=4m/s V_2=?

i) $m_1u_1 + m_2u_2 = m_1V_1 + m_2V_2$ **(1mark)**

5x10+10x4=5x7+10V_2 $V_2 = \frac{90-35}{10}$, $V_2 = 5.5m/s$ **(2marks)**

ii) if two masses join on impact V=? $m_1u_1 + m_2u_2 = (m_1 + m_2)V$ **(1mark)**

5x10+10x4=(5+10)V V= $\frac{50+40}{15}$, $V = 6m/s$ **(2marks)**

iii) If the 10kg mass was initially moving to the left and that the two joined on impact

u_2=-4m/s , $m_1u_1 - m_2u_2 = (m_1 + m_2)V$ **(1mark)**

5x10-10x4=(5+10)V V= $\frac{50-40}{15}$, $V = 0.67m/s$ **(1mark)**

14. a) **Faraday's law** It state that "The e.m.f induced in a circuit is directly proportional to the time rate of change of the magnetic flux through the circuit. " **(2marks)**

$$\varepsilon = -N\frac{\Delta\phi}{\Delta t}$$

b) N=250, A=0.18m^2 ΔB=0.60Wbm^{-3} -0.10 Wbm^{-3}=0.5 Wbm^{-3} **(1mark)**

Δt=0.02s , ε=-N$\frac{\Delta\phi}{\Delta t} = -N\frac{\Delta BA}{\Delta t} - 250\frac{0.5x0.18}{0.02} = -1125V$ **(2marks)**

C) i) galvanometer needle deflect right-ward, induced current is high (i.e is positive) **(1mark)**

ii) no reading in galvanometer, means there is no current induced (**1mark)**

iii) galvanometer needle deflects left-ward, induced current is low (i.e is negative) **(1mark)**

iv) To increase induced current **(1mark)**

v) To increase induced current **(1mark)**

15. $X_c = \frac{1}{L\omega} = \frac{1}{50x10^{-6}x100} = 200\Omega$ **(1mark)**

$X_L = \omega L = 100x80x\ 10^{-3} = 8.0\ \Omega$ **(1mark)**

Impedence Z= $\sqrt{R^2 + (X_L - X_c)^2} = \sqrt{40^2 + (8-200)^2} = 196\ \Omega$ **(2marks)**

The amplitude of the current (maximum current) is given by $\boldsymbol{Im = \frac{Vm}{Z}}$

$I_m = \frac{\mathbf{150}}{\mathbf{196}} = \mathbf{0.765}\boldsymbol{A}$ **(1mark)**

VR = IR = 0.765 × 40 = 30.6 V **(1mark)**
VL = IX_L = 0.765 × 8.0 = 6.12 V **(1mark)**
VL = IX_C = 0.765 × 200 = 153 V **(1mark)**

b)

$V^2 = V_R^2 + (V_L - V_C)^2 = 30.6^2 + (6.12 - 153)^2$

$= 22510.09$

$V = \sqrt{22510.09} = 150V$ **(2marks)**

16. a) i. They are connected in parallel. **(1mark)**

ii. They are connected in series **(1mark)**

b) i) E=$E_1 + E_1 = 2V + 2V = 4V$ **(1mark)**

ii) V=$V_{XY} + V_R$, $V_{XY} = V - V_R = 4V - 2.4V \quad V_{XY} = 1.6V$ **(2marks)**

C) i) $I_{10} = \frac{V}{R} = \frac{1.6V}{10\Omega} = 0.16A$, **(2marks)**

ii) $I_{20,30} = \frac{V}{R} = \frac{1.6V}{(20+30)\Omega} = 0.032A$, **(2marks)**

iii) $I_{Total} = I_{10} + I_{50} = 0.16A + 0.032A = 0.192A$ **(1mark)**

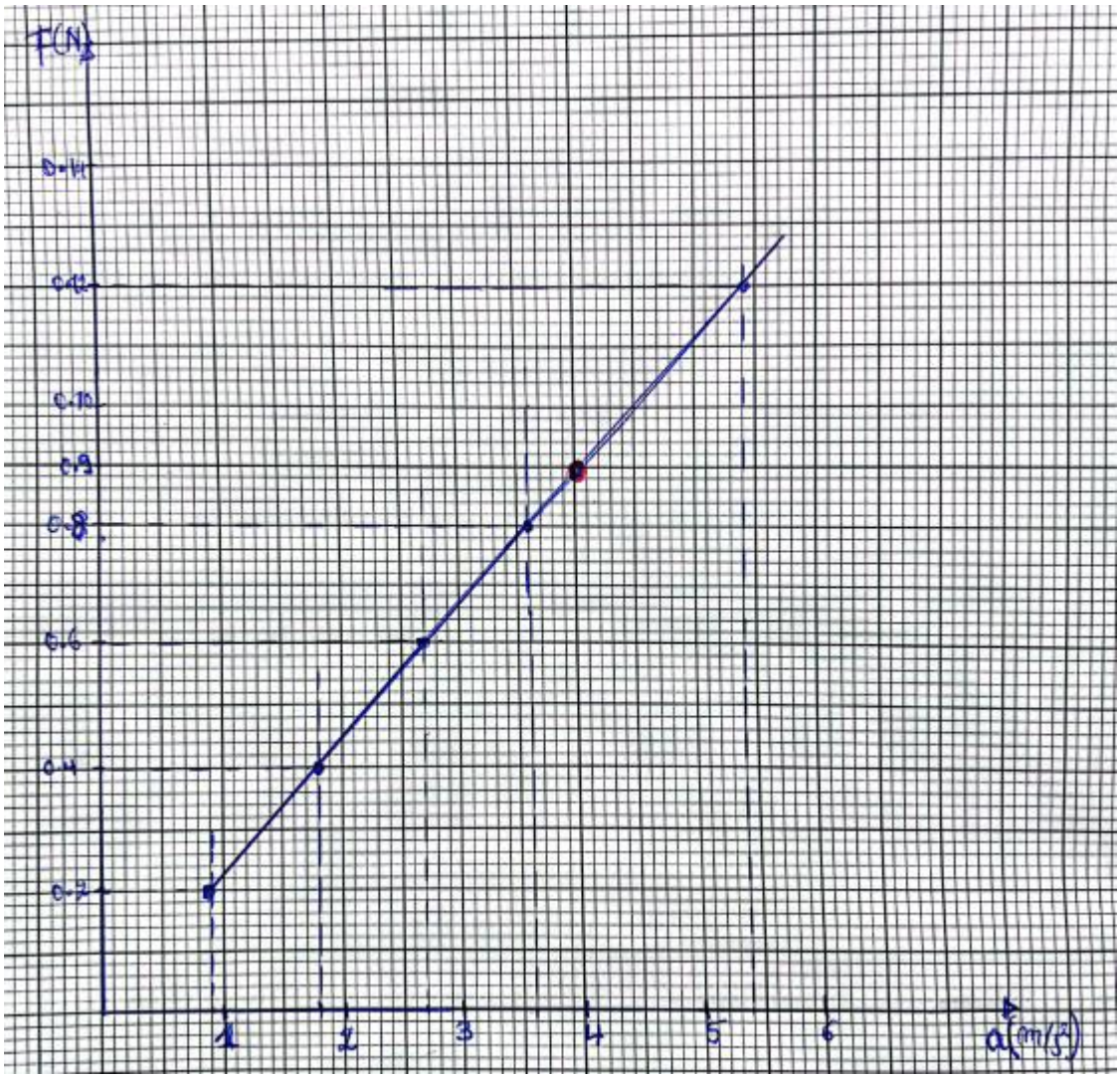
SECTION C (Compulsory 15marks)

17. a) Impulse is defined as a product of the force and the time Fxt

S.I unit is Newton-second (Ns) (**1mark)**

b) Impulse is equal to the change in momentum **(I=ΔP)** (**1mark)**

C) i) Graph of force (F) against acceleration ((**1mark)**



Data Scale and data variable presentation (**2marks)**

Best fit line (**2marks)**

Graph appearance (**5marks)**

ii) by joining the point **F=0.9N** **(1mark)**

iii) F=ma , m=$\frac{F}{a} = \frac{0.9}{4} = \mathbf{0.225}\boldsymbol{Kg}$ (**2marks)**