

535/2
PHYSICS
Paper 2
June 2022
2¼ hours

MWALIMU EXAMINATIONS BUREAU

UCE RESOURCE PRE-MOCK EXAMINATIONS – 2022

PHYSICS
Paper 2

2 Hours 15 Minutes

INSTRUCTIONS TO CANDIDATES

Attempt any **five** questions.

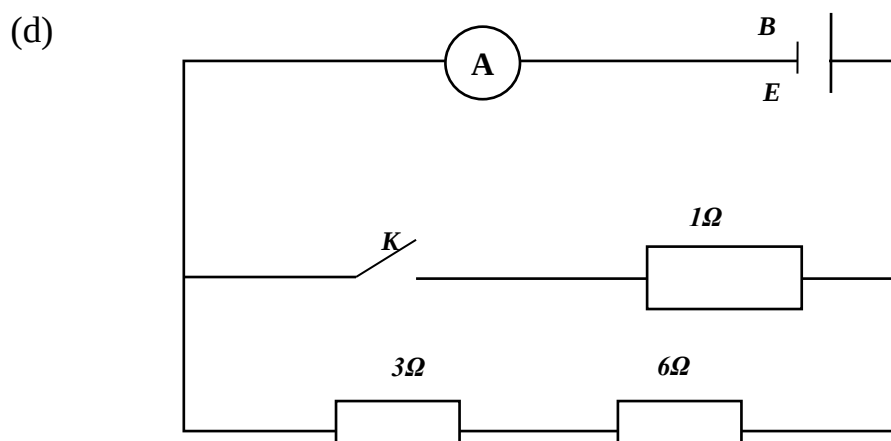
Any extra question **shall not** be assessed

Where necessary assume the following:

Acceleration due to gravity	=	10ms^{-2}
Speed of sound in air	=	320ms^{-2}
Specific heat capacity of water	=	$4200\text{ J kg}^{-1}\text{ K}^{-1}$
Specific heat capacity of copper	=	$400\text{ J kg}^{-1}\text{ K}^{-1}$
Specific latent heat of fusion of water	=	340000J Kg^{-1}
Specific latent heat of vaporisation of water	=	2260000J Kg^{-1}
Velocity of electromagnetic waves	=	$3.0 \times 10^8\text{ ms}^{-1}$

1. (a) State Hooke's law of elasticity. (01 mark)
 - (b) Different loads, W , are applied to the end of an elastic wire and corresponding extension, e , of the wire recorded:
 - (i) Sketch a labelled graph of e against W . (03 marks)
 - (ii) Describe briefly the features of the graph in $b(i)$. (02 marks)
 - (c) A spring of natural length $5.0 \times 10^{-2}m$ extended by $2.0 \times 10^{-3}m$ when a force of $1.8N$ acts on it. Calculate the extension when a force of $10N$ is applied to the spring. (04 marks)
 - (d) (i) Describe an experiment to demonstrate the existence of surface tension. (04 marks)
 - (ii) State two ways of reducing surface tension. (02 marks)
2. (a) (i) Distinguish between potential energy and kinetic energy. (02 marks)
 - (ii) State the energy changes which occur when a car collides with a wall. (02 marks)
 - (b) A crane lifts a car mass of 1500 kg through a height of 3.2 m to load it onto a carrier. Find the work done against gravity. (02 marks)
 - (c) (i) With the aid of a diagram, describe an experiment to determine the mechanical advantage of a pulley system of velocity ratio 3. (06 marks)
 - (ii) Explain why the efficiency of a pulley system is less than 100%. (02 marks)
 - (d) Give two examples where pulleys are used. (02 marks)
3. (a) Group the following quantities into scalars or vectors: mass, momentum, acceleration, time. (02 marks)
 - (b) Describe an experiment to determine the acceleration due to gravity using a simple pendulum. (06 marks)
 - (c) A spear of mass 2.0 kg is thrown into a heap of sand and sinks 1.5 m into the sand. If the average force opposing its motion into the sand is $2,500\text{ N}$, find the velocity with which it strikes the sand. (03 marks)
 - (d) Explain why a bus carrying standing passengers has a higher chance of overturning than one carrying seated passengers. (02 marks)
 - (e) (i) State the principle of moments. (01 mark)
 - (ii) A boy of mass 48 kg sits at a distance of 1.2 m from a pivot of a sea saw to balance a girl of mass 40 kg . At what distance from the pivot is the girl seating? (02 marks)
4. (a) (i) What is meant by rectilinear propagation of light? (01 mark)
 - (ii) Name two effects which are best explained by rectilinear propagation of light. (02 marks)

- (b) (i) Describe a simple experiment to determine the focal length of a converging mirror. (04 marks)
- (ii) An object is 5 cm high and is placed 10 cm from a concave mirror of focal length 20 cm. Find by graphical method, the position, size, magnification and nature of the image formed. (06 marks)
- (c) (i) Define power of a lens. (01 mark)
- (ii) Find the power of a diverging lens of focal length 30cm. (02 marks)
5. (a) (i) Draw a well labelled diagram of a gold leaf electroscope. (02 marks)
- (ii) Explain how a gold leaf electroscope is used to test whether a material is charged or not. (02 marks)
- (b) (i) State Ohm's law. (01 mark)
- (ii) What is meant by the term electromotive force (e.m.f) of a cell? (01 mark)
- (c) State the factors that affect resistance of a conductor. (02 marks)



B is a cell of e.m.f E and internal resistance, r . When the switch **K** is closed the current flowing through ammeter **A** is 5A. When the switch **K** is open the current is 4A.

Calculate:

- (i) the internal resistance r_1 of the cell. (04 marks)
- (ii) the emf of the cell (02 marks)
- (iii) the power lost in the cell when switch **K** is closed. (02 marks)
6. (a) Define the following terms as applied to wave motion.
- (i) Amplitude (01 mark)
- (ii) Frequency (01 mark)

- (b) (i) What is meant by interference of waves? (02 marks)
(ii) Using a labelled diagram, show how circular water waves are reflected from a straight barrier. (03 marks)
- (c) (i) Use a labelled diagram to show the bands of an electromagnetic spectrum. (03 marks)
(ii) Calculate the frequency of a radio wave of wavelength 2 m. (03 marks)
- (d) With the aid of a diagram, show dispersion of white light by a prism. (03 marks)
7. (a) What is meant by latent heat of vaporisation? (01 mark)
(b) With the aid of labelled diagram, describe how a refrigerator works. (07 marks)
(c) The cooling system of a refrigerator extracts 0.7KW of heat. How long will it take to convert 500g of water to 20°C into ice at 0°C.? (04 marks)
(d) Explain how evaporation takes place. (04 marks)
8. (a) (i) Distinguish between nuclear fission and nuclear fusion. (02 marks)
(ii) State one example where nuclear fusion occurs naturally. (01 mark)
(b) State one use of nuclear fission. (01 mark)
(c) The following nuclear reaction takes place when a neutron bombards a sulphur atom.
- $${}_{16}^{34}\text{S} + {}_0^1\text{n} \longrightarrow {}_b^a\text{Y}$$
- (i) Describe the composition of **Y**. (02 marks)
(ii) The nuclide **Y** decays by emission of an alpha – particle and a Gamma – rays. Find the changes in mass number and atomic number of the nuclide. (02 marks)
(iii) State **two** properties of alpha particles. (02 marks)
- (d) The half life of the isotope **X** is 3×10^3 years. What fraction of the isotope remains after 6,000 years? (03 marks)
- (e) State:
(i) one medical use of radio isotopes. (01 mark)
(ii) two ways of minimizing the hazardous effect of radiations from radioactive materials. (02 marks)

END