

NamePersonal No.....

535/2

PHYSICS

PAPER 1

$2\frac{1}{4}$ Hours



MATIGO MOCK EXAMINATIONS
UGANDA CERTIFICATE OF EDUCATION
PHYSICS
PAPER 1
TIME: 2 HOURS 15 MINUTES

Instructions:

Answer all questions in section A, using the table given below and section B in the spaces provided on the question paper.

Where necessary assume the following:

- Acceleration due to gravity = 10m/s^2
- Speed of sound in air = 330m/s
- Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$
- Specific heat capacity of ice = $2100\text{Jkg}^{-1}\text{K}^{-1}$
- Density of mercury = 13600kg m^{-3}

SECTION A:

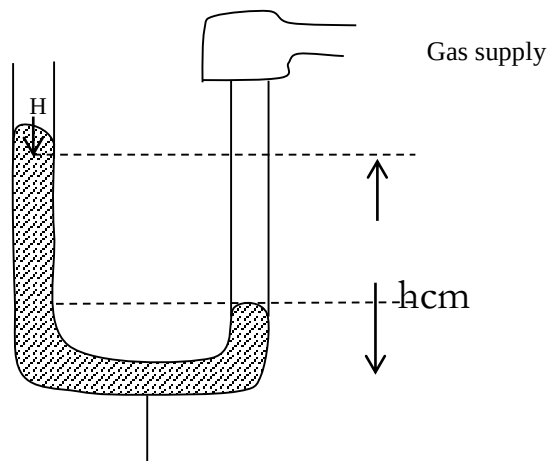
1. Which of the following radiations has the shortest wave length?
 A: x-rays B: visible light C: Radio waves D: Gamma rays

2. An echo is produced when sound waves are:
 A: Absorbed by objects B: reflected back by objects
 C: transmitted by objects D: bent around corners by objects

3. A small metallic object may float on clean water, but sinks when some detergent is added to the water, due to the detergent;
 A: making water surface slippery
 B: lowering the surface tension of water
 C: Reducing the density of water
 D: increasing the adhesive force between the metal and water molecules

4. A machine of velocity ratio 5 is used to raise a load whose weight is 200N. The effort required is 50N. What is the efficiency of the machine?
 A: 50% B: 75% C: 80% D: 125%

5.



The diagram above shows a mercury manometer. H is the atmospheric pressure and h is the difference in height between the

two mercury levels in the U-tube both measured in centimetres. The pressure of the gas in Nm^{-2} is

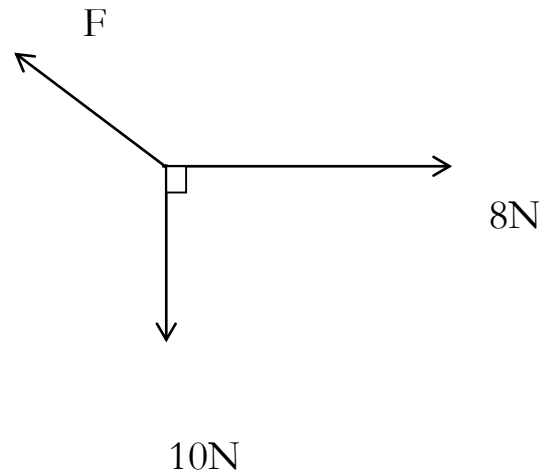
A: $\frac{h}{100} \times 13600 \times 10$

B: $\frac{H}{100} \times 13600 \times 10$

C: $\frac{(H + h)}{100} \times 13600 \times 10$

D: $\frac{H - h}{100} \times 13600 \times 10$

6.



Three forces act on a body as shown above. If the forces are in equilibrium, then the value of F is

A: 2N

B: 5

C: 10N

D: 80N

7. An object weighs 200N and 120N when in air and when totally submerged in a liquid of density 800kgm^{-3} respectively. The weight of the liquid displaced is

A: 8N

B: 40N

C: 80N

D: 120N

8. Which of the following are vector quantities?

A: Density, velocity and force

B: velocity, time and displacement

C: magnetic field, weight and velocity

D: magnetic field, mass and acceleration

9. Isotopes are nuclides with the same number of

A: protons but different number of electrons

B: protons but different number of neutrons

C: electrons and the same number of neutrons

D: neutrons but different number of protons

10. In a hydraulic press, the area of the piston on which the effort is applied is made smaller in order to:

A: Facilitate the movement of the piston downwards
 B: obtain a pressure as large as possible
 C: transmit pressure equally throughout the liquid
 D: transmit a force as large as possible to the load.

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11. A mass of 500g causes a spiral spring to extend by 4cm. The force that would cause an extension of 6cm is

A: 2.0N B: 3.3N C: 4.8N D: 7.5N

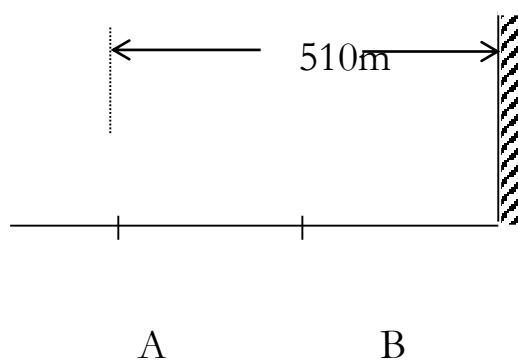
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12. The half life of a radioactive material is 20 years. Find the initial mass of the material, if 2g remains after 80 years.

A: 4g B: 8g C: 16g D: 32g

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A girl at A clapped her hands once and a boy at B heard two claps. The interval between the two sounds being 15. Calculate the distance between A and B

A: 255m B: 330m C: 345m D: 510m

14. A stone of mass 50g falls freely from a height of 5m. Find the velocity with which it hits the ground.

A: 3.2ms^{-1}
 B: 4.5ms^{-1}
 C: 7.1ms^{-1}
 D: 10ms^{-1}

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15. An oil drop of volume $1 \times 10^{-9} \text{ m}^3$ spreads on a water surface to form a patch of area $5 \times 10^{-2} \text{ m}^2$. If the patch is one molecule thick, find the approximate number of molecules in the drop

A: 5×10^7
 B: 20×10^7
 C: 100×10^7
 D: 3×10^{14}

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16. An aircraft of mass 5000kg moves with an initial velocity of 10ms⁻¹, on a runway. It then accelerates at 4 ms^{-2} for 25 seconds before it takes off. Its change in momentum before take off is
- A: 2.5×10^5 B: 3.0×10^5 C: 5.0×10^5 D: 5.5×10^5

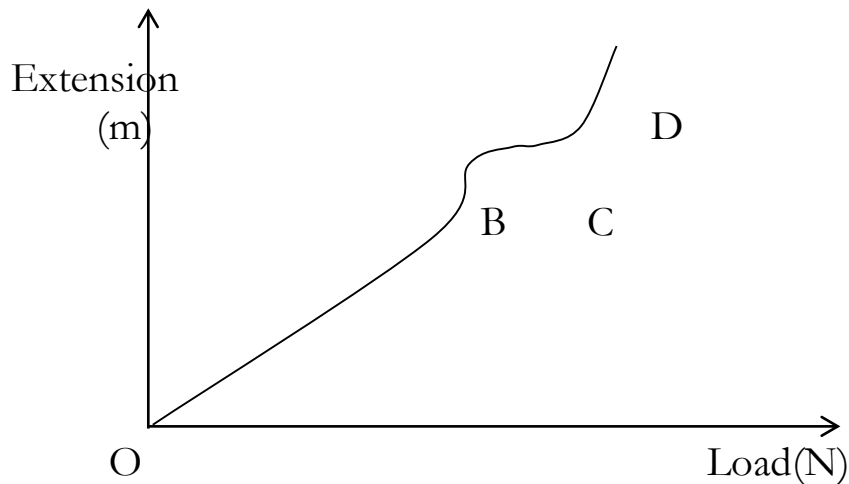
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17. Which of the following represents the firing order of a four stroke petrol engine?

A: Inlet, power, exhaust and compression strokes
 B: inlet, power, compression and exhaust strokes
 C: power, compression, inlet and exhaust strokes
 D: Exhaust, inlet, compression and power strokes.

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18.


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The diagram above shows extensions of a curve against load added to the wire. Hooke's law is obeyed between

A: OC B: AD C: AB D: OA

19. Which one of the following controls the brightness of a spot on the screen of a cathode ray oscilloscope?

A: X-plates B: Y – plates

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- C: The grid
D: The anode.
20. The particles of the medium through which a longitudinal wave travels
A: Vibrate parallel to the direction of the propagation of the wave
B: Move along with the wave
C: move in opposite direction to the wave
D: vibrate perpendicular to the direction of the propagation of the wave.
21. Which of the choices below best describes nature of images formed by convex mirror
A: Real, virtual, magnified
B: Diminished, real, erect
C: Diminished, magnified, virtual
D: virtual, diminished, erect.
22. A beam of white light is to be passed through a combination of 2 filters. Which combination would allow only red light?
A: Blue and Red filters
B: Cyan and Red filters
C: yellow and magenta
D: cyan and magenta
23. An image of an object 5cm is formed by a converging lens. If the magnification is $\frac{1}{4}$, find the height of the object.
A: 2.0cm B: 20cm C: 1.25cm D: 4.75cm
24. For a person who is short sighted the rays of light from
A: Distant objects are focussed in front of the retina
B: near objects are focussed behind the retina
C: Distant objects are focussed behind the retina
D: Near objects are focussed in front of the retina.
25. Which of the choices represents the firing order of a four stroke petrol engine
A: Exhaust, induction, compression and power
B: induction, power, compression and exhaust

C: power, compression, exhaust and induction
 D: induction, compression, exhaust and power.

26. It requires 108J to raise the temperature of a certain mass of a metal from 20°C to 30°C. If the metal has a specific heat capacity of $108\text{Jkg}^{-1}\text{K}^{-1}$ find the mass of the metal.

A: 1kg B: 10kg C: 0.01kg D: 0.1kg

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27. A sensitive thermometer is one which

A: is sensitive to heat
 B: can record big changes in temperature
 C: can record small changes in temperature
 D: has a large bore.

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28. A fixed mass of gas of volume 10L at a pressure of 100Pa and a temperature of 50°C has its volume increased to a new volume V_2 by raising its temperature to 100°C. Determine the new volume V_2 at constant pressure.

A: 20L B: 10L C: 11.5L D: 7.31L

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29. How many coulombs of charge pass through a conductor while a current of 5A flow throughout it for 100s. ?

A: 0.005 B: 20 C: 500 D: 2500

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30. Permanent magnets are made from

A: diamagnetic materials B: ferromagnetic materials
 C: paramagnetic materials D: dielectric materials

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In each of the questions 31 to 35 one or more answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C, and D according to the following:

A: if 1,2,3 only are correct
 B: if 1,3 only are correct
 C: if 2,4 only are correct
 D: if only 4 is correct

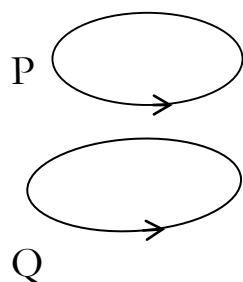
31. The magnitude of the force on the coil depends on:

1. the strength of the magnetic field
 2. the number of turns of the coil
 3. the current through the coil
 4. the mass of the coil support

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32. Resistance to current flowing through a conductor depends on
1. length of the conductor
 2. cross section area of conductor
 3. material of the conductor
 4. colour of the conductor.
- ☐
33. Electromotive force of a cell is
1. Resistance offered by the cell to flow of charge
 2. The p.d across its terminals on a closed circuit
 3. The electric force in a cell that drives a current
 4. The potential difference across its terminals on an open circuit.
- ☐
34. In which of the following appliances is use made of the forces on a current-carrying coil in a magnetic field?
1. electric bell
 2. moving coil galvanometer
 3. telephone receiver
 4. electric motor.
- ☐
35. Advantages of the lead-acid accumulator are
1. its internal resistance is low
 2. it can be recharged
 3. it produces a steady e.m.f for a long time
 4. No chemicals are used.
- ☐
36. A battery of internal resistance 2Ω is connected too an external resistance of 10Ω . If the p.d. across the 10Ω resistor is 6V, find the e.m.f of the battery
- A: 1.2V B: 4.8V C: 6.0V D: 7.2V
- ☐
37. When a 2kW electric fire is connected to a 240V mains, the fuse in the plug is
- A: 1A B: 3A C: 5A D: 7A
- ☐

38. P and Q are two parallel circular coils each carrying a current as shown


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- A: P and Q repel each other
 B: P moves, Q stays still
 C: P and Q attract each other
 D: Q moves, P stays still.

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39. In a simple electric motor, the commutator

- A: connects the brushes together
 B: reverses the magnetic field
 C: changes the current strength in the coil
 D: changes the current direction in the coil

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40. In a house wiring system, all connections to power points are in parallel so as to

- A: supply the same current
 B: operate at the same voltage
 C: minimise cost of electricity
 D: consume the same amount of energy

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SECTION B:

41. (a) What is meant by thermionic emission? (1 mark)

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(b) State two properties of cathode rays (1 mark)

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(c) Describe briefly the action of a thermionic diode (2 marks)

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42. (a) A ticker tape-timer vibrates at a frequency of 40Hz. The distance between two consecutive dots is 4cm. Find:

(i) the time that elapses between two consecutive dots
 ($1\frac{1}{2}$ marks)

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- (ii) the average speed of the tape. (2mark)

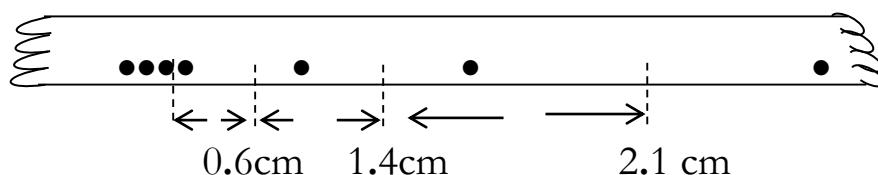
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- (b) Using the ticker-timer in (a), the tape dots shown below were obtained



- Calculate the acceleration of the tape. (Assume that the tape was pulled at a constant acceleration). $(1\frac{1}{2} \text{ marks})$

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43. (a) Draw a labelled diagram of a thermos flask. (2 marks)

(b) How are heat losses by conduction, convection and radiation minimised? (2 marks)

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44. (a) Define specific heat capacity (1mark)

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(b) An immersion heater rated 1000W, 250V, supplies heat to 80kg of liquid in a tank. If the temperature of the liquid rises from 25°C to 65°C in 48 minutes. Determine the specific heat capacity of the liquid. (3marks)

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45. A dam at a height of 550m above sea level supplies water to a hydro-electric generating power station which is at a height of 50m above sea level. 2000kg of water pass through the turbines in one second.

(a) calculate:

- (i) the potential energy per second. ($1\frac{1}{2}$ marks)

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- (ii) The maximum electrical power output at the station if the whole system is 80% efficient? ($1\frac{1}{2}$ marks)

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- (b) Find the velocity of the water when it reaches the generating station (1 mark)

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46. (a) Define each of the following terms as applied to wave motion

- (i) wave front (1 mark)

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(ii) wavelength (1mark)

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(c) A tuning fork of frequency 440Hz produces resonance when the length of a resonance tube above the water surface is 200mm and again when its 575 mm. Calculate the speed of sound in air. (2marks)

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47. (a) Explain the meaning of the following terms when used in reference to light

(i) Refractive index of an optical medium (1mark)

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(ii) Critical angle of an optical medium (1mark)

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(b) The refractive index of glass is 1.50. Determine the velocity of light in glass (2marks)

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48. (a) (i) Distinguish between a conductor and an insulator (1mark)

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(ii) Give one example of each in (A) (i) above. (1mark)

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(b) Describe how a brass sphere can be charged positively by induction using a positively charged cellulose acetate. (2marks)

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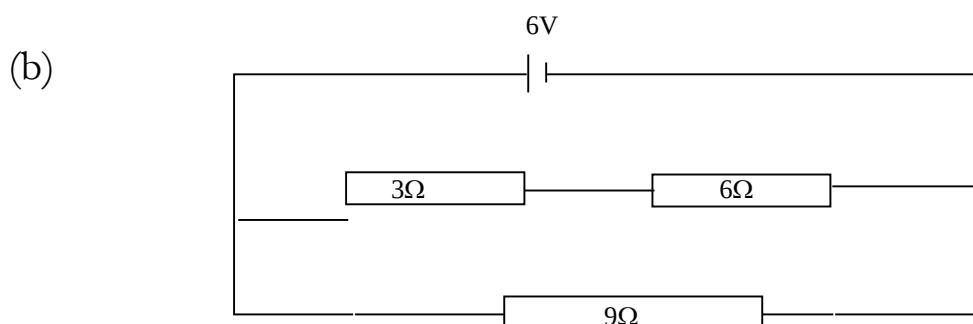
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49. (a) With help of a circuit diagram, show how the following instruments would be connected: 2 dry cells, Ammeter, Voltmeter, Rheostat, switch.



- (i) Find the p.d across the 3Ω resistor (2marks)

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- (ii) Find the power dissipated in the 3Ω resistor. (2 marks)

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50. (a) State Faraday's law of electromagnetic induction (1 mark)

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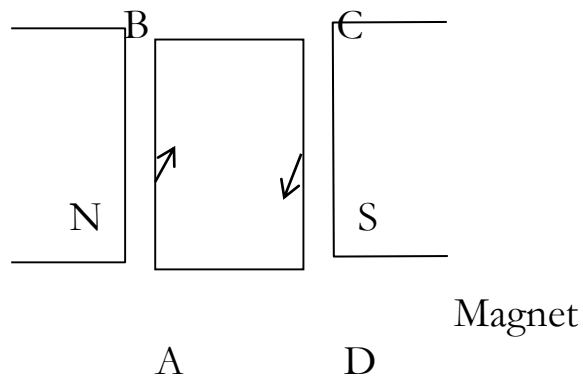
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(b)



ABCD is a copper coil being rotated in a magnetic field. Indicate on the diagram the direction of the induced current.

- (c) How are eddy current losses reduced in motors and generators?

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END