Name …….Personal 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 $Jkg^{-1}k^{-1}$
- Specific heat capacity of ice = 2100 $Jkg^{-1}k^{-1}$
- Density of mercury = 13600 kg m^{-3}

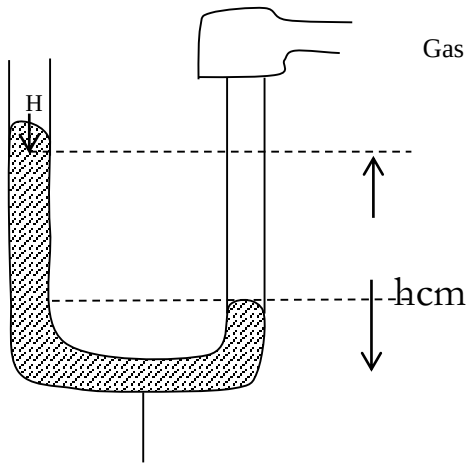
SECTION A:

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. 

Mercury

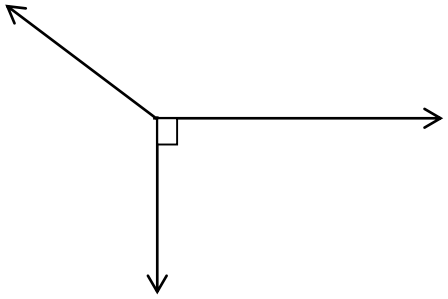
The diagram above shows a mercury manometer. H is the atmospheric pressure and h is the difference in height between the

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

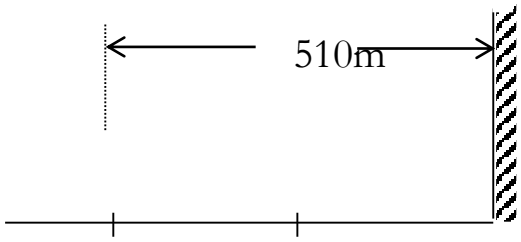
9. Isotopes are nuclides with the same number of
   A: protons but different number of electrons
   B: protons but different number of neutrons
   C: electrons and the same number of neutrons
   D: neutrons but different number of protons

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.

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

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

13.



A B

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

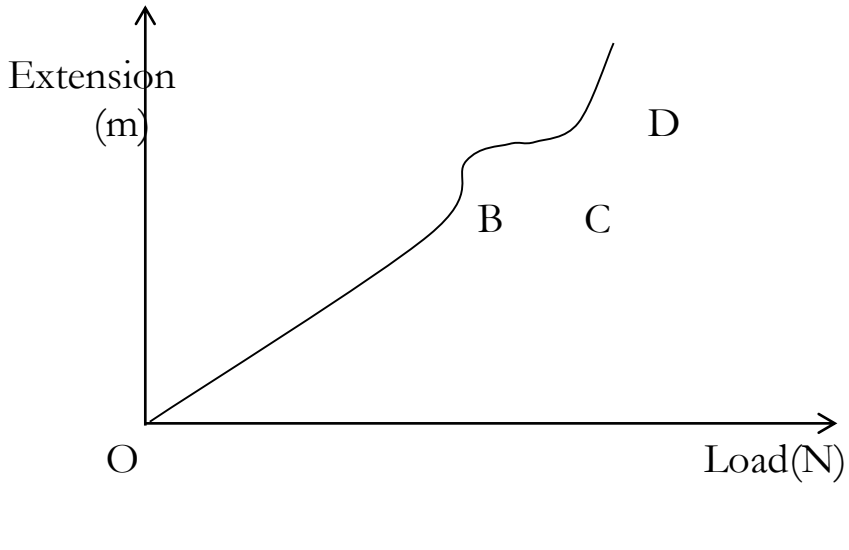
14. A stone of mass 50g falls freely from a height of 5m. Find the velocity with which it hits the ground.
A: 3.2ms $^{-1}$
B: 4.5ms $^{-1}$
C: 7.1ms $^{-1}$
D: 10 ms $^{-1}$

15. An oil drop of volume 1 x 10^{-9} m^3 spreads on a water surface to form a patch of area 5 x 10^{-2} m^2. If the patch is one molecule thick, find the approximate number of molecules in the drop
A: 5 x 10^7
B: 20 x 10^7
C: 100 x 10^7
D: 3 x 10^{14}

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

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.

18.



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

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 ¼ , 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 108Jkg $^{-1}$ k $^{-1}$ find the mass of the metal.
A: 1kg B: 10kg C: 0.01kg D: 0.1kg

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.

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

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

30. Permanent magnets are made from
A: diamagnetic materials B: ferromagnetic materials
C: paramagnetic materials D: dielectric materials

In each of the questions 31 to 35 one or more answers giv 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

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.

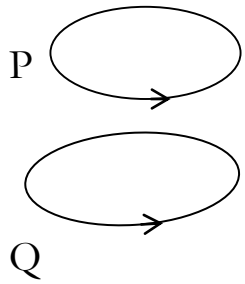
34. In which of the following appliances is use made of the forces on a current-carrying coil in a magnetic field?
    1. electric bell
    2. moving coil galvanometer
    3. telephone receiver
    4. electric motor.

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



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.

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

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

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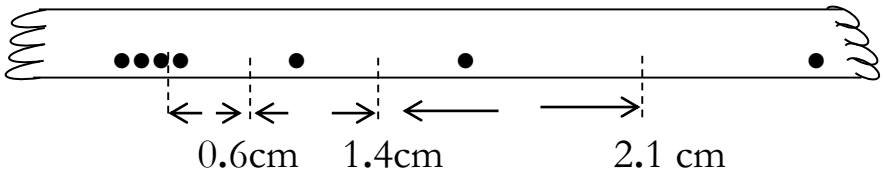
(b) Using the ticker-timer in (a), the tape dots shown below were obtained



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

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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 (1mark)

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

(i) wave front (1mark)

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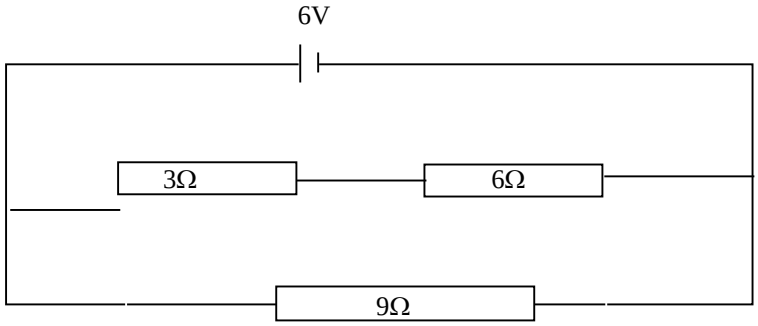
49. (a) With help of a circuit diagram, show how the following instruments would be connected: 2 dry cells, Ammeter, Voltmeter, Rheostat, switch.

(b)



(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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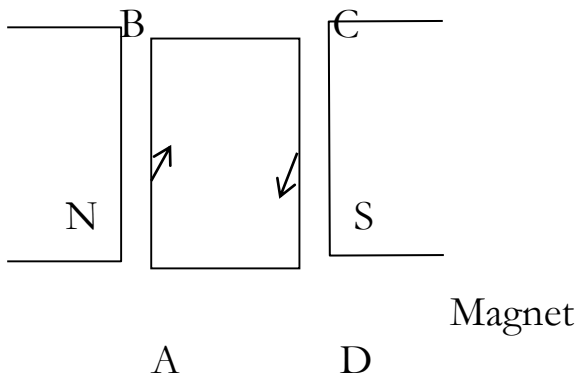
(b)



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