Name:.....

Index No.:..... Signature:.....

535/1
PHYSICS
Paper 1
June/July 2023
2 ¼ Hours

ACEITEKA JOINT MOCK EXAMINATIONS 2023
UGANDA CERTIFICATE OF EDUCATION
PHYSICS
Paper 1
2 Hours 15 Minutes

INSTRUCTIONS TO CANDIDATES

- Section A contains 40 objective type of questions. Write only one letter representing the correct answer in the box provided.
- Answers to section B are to be written in the spaces provided on the question paper.
- Mathematical tables and non-programmable scientific calculators may be used.
- The following values of physical quantities may be useful to you:
  - Acceleration due to gravity = $10ms^{-2}$
  - Specific heat capacity of water = $4200JKg^{-1}K^{-1}$
  - Velocity of light in air = $3.0 \times 10^{8}ms^{-1}$

For Examiner's Use Only

Q.41	Q.42	Q.43	Q.44	Q.45	Q.46	Q.47	Q.48	Q.49	Q.50	MCQ	Total

SECTION A

1. Which property of a body resists change from a state of rest or of motion?

   A. density
   B. mass
   C. volume
   D. weight

2. Identify the nucleus that is produced when americium - 241 Am ($^{241}_{95}AM$) emits an alpha-particle?

   A. $^{237}_{93}Np$ B. $^{245}_{93}Np$ C. $^{237}_{97}Bk$ D. $^{245}_{97}Bk$

3. A car's **acceleration** and maximum **speed** are improved by using an engine of smaller **mass** and greater driving **force.** How many of the underlined quantities are vectors?

   A. 1 B. 4 C. 3 D. 2

4. Electrical apparatus is protected from magnetic fields by placing the apparatus in a box. What is the box made from?

   A. aluminium B. iron C. rubber D. steel

5. Which type of electromagnetic radiation is produced during radioactive decay?

   A. alpha-particles
   B. beta-particles
   C. gamma-rays
   D. X-rays

6. Which statement about red light and blue light is correct?

   A. Red light has a longer wavelength than blue light.
   B. Red light has a higher frequency than blue light.
   C. Red light has the same speed in glass as blue light.
   D. Red light is refracted by a glass prism more than blue light.

7. Which of the following is the best conductor of heat?

   A. Silver B. Iron
   C. Copper D. Aluminium

8. Two resistors of 2Ω and 3Ω are connected in series with a 10 volts battery of negligible internal resistance. The potential difference across a 3Ω resistor is

A. 10V B. 2V C. 5V D. 6V

9. Which process in the Sun produces energy?

A. Burning B. Nuclear fission

C. Nuclear fusion D. Radiation

10. A ray of light in a transparent medium of refractive index 1.8 is incident on the surface as shown in figure 1.

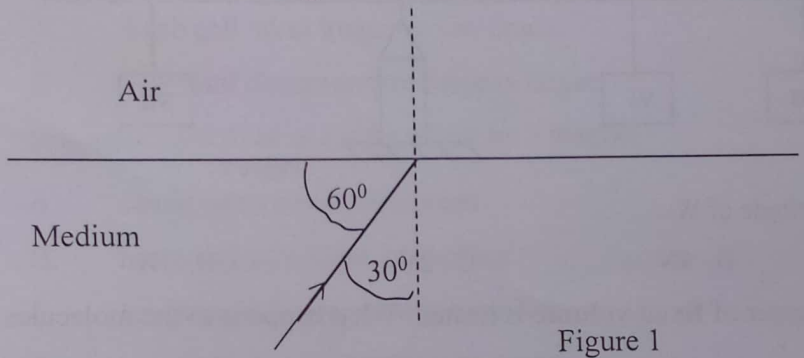

Figure 1

What is the angle between the refracted ray and the normal in air?

A. 29° B. 64° C. 54° D. 33°

11. A bullet of mass 15g is fired with a speed of 400ms^{-1}. The rifle recoils with a speed of 1ms^{-1}. Find the mass of the rifle.

A. 6kg B. 0.6kg C. 3.0kg D. 60.3kg

12. Which type of electromagnetic radiation is produced during radioactive decay?

A. Gamma rays B. beta - particles

C. Alpha - particles D. X-rays

13. How much heat is required to raise the temperature of 20g of water from 30°C to 60°C?

A. 6300 J B. 2520J C. 84000J D. 2520000J

14. The density of a substance is the

A. Space occupied by the substance

B. Volume of a given unit quantity of matter

C. Pull of gravity on a substance

D. Quantity of matter in unit volume

15. A light beam AB is in equilibrium when forces of 2N, 2N and P act on it as shown in figure 2.

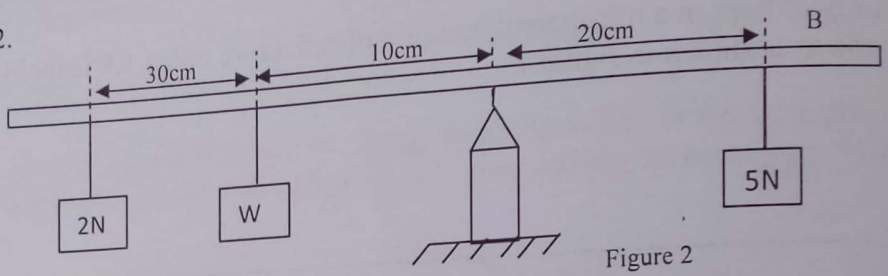

Figure 2

What is the magnitude of W

A. 5N B. 4N C. 2N D. 1N

16. A gas in a container of **fixed volume** is heated. What happens to the molecules of the gas?

A. They collide less frequently. B. They expand.

C. They move faster. D. They move further apart.

17. Newton's third law involves two quantities which are equal in size and opposite in direction. What is the unit for these two quantities?

A. J B. N C. ms^{-2} D. W

18. A 2.0 kg mass has 300 J of kinetic energy. What is the speed of the mass?

A. 8.7 ms^{-1} B. 12 ms^{-1} C. 300 ms^{-1} D. 17.3 ms^{-1}

19. An image is formed by a thin converging lens when it is used as a magnifying glass. What is the correct description of the image?

A. real and erect B. real and inverted

C. virtual and erect D. virtual and inverted

20. A charge of 7.5 C flows through a resistor in 5.0 s. A student has ammeters with different ranges that he can use to measure the current in the resistor.
Which ammeter range is the most appropriate?

A. 0 - 1 A B. 0 - 2 A C. 0 - 5 A D. 0 - 40 A

21. Three identical cells are connected in parallel to a resistor.
What is the advantage of using three cells in parallel, rather than using a single cell?

A. Each cell produces more energy.
B. Each cell supplies more charge.
C. Each cell takes longer to run down.
D. The total electromotive force is larger.

22. Magnetic saturation is a state where by a magnet

A. can acquire more magnetism
B. has acquired excess magnetism
C. has acquired maximum magnetism
D. cannot be magnetized by any means

23. Figure 3 shows the information found on an electric kettle.

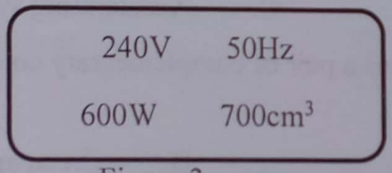

Figure 3

What is the frequency of the electrical supply used to power the kettle?

A. 50 Hz B. 240 V C. 600 W D. 700 cm3

24. A radioactive material decays by this process:

$$^{Y}_{Z}L \longrightarrow {}^{Y}_{Z+1}M + x$$

What is particle x?

A. a proton B. a helium nucleus C. a neutron D. an electron

25. Figure 3 shows magnetic field lines between two magnetic poles.

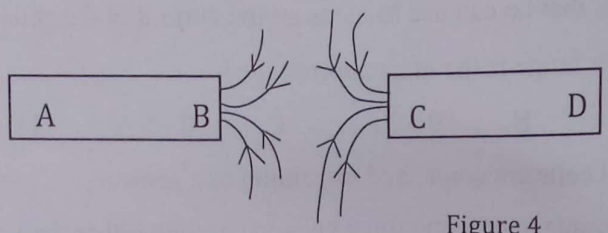

Figure 4

The poles A, B, C and D respectively are

A. South, north, north and south
B. North, south, south and north
C. North, north, south and north
D. South, south, north and south.

26. A vibrator produces waves which travel a distance of 35 cm in 2 seconds. If the distance between successive crests is 5cm, what is the frequency of the vibrator?

A. 3.5Hz
B. 7.0 Hz
C 14.0Hz
D. 87.5 Hz

27. The X and Y- plates in a cathode ray oscilloscope make up the

A. Electron gun
B. Deflection system
B. Focusing system
C. Accelerating system

28. Which one of the following makes a pair of complementary colours?

A. margarita and yellow
B. Green and red
C. Green and yellow
D. Yellow and blue

29. Electric heating element rates 1.20kW is used to heat water for 4 hours. Find the electrical energy consumed in joules.

A. $\frac{120 \times 4}{1000}$
B. 1.20 x 1000 x 4 x 60
C. $\frac{1.2 \times 4 \times 60 \times 60}{1000}$
D. 1.20 x 1000 x 4 x 3600

30. A block exerts a pressure of 4.0×10^4 Pa on the ground. Calculate its mass in kg if its area in contact with ground is 6 cm^2

A. 24 kg B. 4.8 kg C. 2.4 kg D. 48 kg

31. Two forces of 24N and 32N acts at right angle on A body of mass 2kg. Calculate the acceleration of the body in ms^{-2}.

A. $\frac{40}{2}$ B. $\frac{2}{40}$ C $\frac{56}{2}$ D. $\frac{2}{56}$

32. The vapour which is in a state of dynamic equilibrium with its liquid is said to be

A. Unsaturated B. Saturated

C. Disequilibrium D. Motion

33. Surface tension in a liquid may be weakened by

A. Lowering the temperature C. increasing the amount of liquid

B. Adding soap solution D. increasing the density of the liquid

34. Which waves are longitudinal?

A. sound waves in water B. ultra-violet waves in air

C. waves on the surface of water D. X-rays in a vacuum

35. Which one of the following devices produces direct current from alternating current?

A. Transformer C. Heater

B. Motor D. Diode

36. What proves that a metal bar is a permanent magnet?

A. It attracts both ends of a compass needle.

B. It attracts one end of another magnet.

C. It conducts electricity.

D. It repels one end of another magnet.

37. A shoe becomes positively charged by friction when it rubs against a carpet. What happens as the shoe becomes charged?

A. Negative electrons are transferred to the carpet.

B. Negative electrons are transferred to the shoe.

C. Positive electrons are transferred to the carpet.

D. Positive electrons are transferred to the shoe.

38. A mass of 0.2 kg produces an extension of 5 cm of a spring on earth's surface. What is the extension of the same spring when the same mass of 0.2 kg on the moon's surface, if acceleration due to gravity on moon's surface is 1.6 ms^{-2}?

A. 0.08 cm B. 5 cm C. 0.8 cm D. 31.25 cm

39. A piece of metal weighs 1.0N in air and 0.6N when fully immersed in water. What will be its weight when fully immersed in a liquid of relative density 0.8?

A. 1.2N B. 0.68N C. 0.48N D. 0.80N

40. The temperature at which all the heat energy is removed from a substance is

A. absolute temperature. C. zero kelvin.

B. zero temperature. D. zero Celsius.

SECTION B

41. (a) What is **friction?**

(1 mark)

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(b) Write a scientific description of the process of sharpening a knife.

(1 mark)

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(c)A force of 200N is used to push a body of mass 50kg along a rough surface and it accelerates at a rate of $3ms^{-2}$

Find the frictional force between the body and the rough surface. (2 marks)

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42. (a) **Carbon -14** is a radioactive isotope of **carbon**. What does the above statement mean? (1 mark)

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(b) A radioactive sodium ($^{24}_{11}Na$) decays to form magnesium -24 with emission of a beta particle. Write a nuclear balanced equation for the decay. (2 marks)

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(c) State **one** biological hazard of radioactive isotopes. (1 mark)

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43. (a) State **two** differences between **light waves** and **sound waves.** (2 marks)

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(b) Stationary waves are set up in a long thin wire using a suitable vibrator of frequency 50Hz. The distance between successive points of minimum displacement is 4.7cm. Find the velocity of transverse waves in wire. (2 marks)

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(c) State **one** application of heat. (1 mark)

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48. (a) Distinguish between a magnetic field and an electric field.
(2 marks)

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(b) Briefly describe the process of charging by friction. (2 marks)

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49. (a) What is the effect of the arrangement of dipoles in un magnetised magnetic materials? (2 marks)

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(b) Two long vertical wires carry electric currents in opposite directions. Sketch a magnetic field pattern around the wires. (2 marks)

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44. (a) Distinguish between **real** and **virtual** images. (2 marks)

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(b) A person uses a lens of focal length 5cm as a magnifying glass to form an image 30cm from the lens. Find its magnification.

(2 marks)

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45. (a) Define the term **potential difference.** (1 mark)

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A milliameter of full scale deflection of 2mA and resistance100Ω is to be converted into a voltameter to read 5V. Find the resistance of the resistor to be used. (2 marks)

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(c) State **one** use of a transformer. (1 mark)

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(1 mark)

46. (a) What is **momentum?**

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(b) An arrow of mass 200g moving at a speed of 30ms-1 gets stuck in an apple of mass 400g resisting on a floor. If the two move with a uniform retardation of 5ms-2. Find the distance covered before coming rest. (3 marks)

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47. (a) What is **heat** ? (1 mark)

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(b) 5kg of water at 40oC in a tank flows through a metallic pipe and the temperature of the water at the end of the pipe is found to be 30o, Estimate the amount of heat absorbed by the pipe. (2 marks)

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50. (a) Distinguish between **a strut** and **a tie**. (2 marks)

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(b) What is the **use** struts and ties in a structure. (1 mark)

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(c) State **one** advantage of reinforced concrete. (1 mark)

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END.