Candidate's Name: .....

Signature:.....

Random No.						Personal No.		

(Do not write your School Name or Number anywhere on this booklet.)

535/1
PHYSICS
Paper 1
Jul. / Aug. 2023
2¼ hours

WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA MOCK EXAMINATIONS 2023

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Section **A** *contains* **40** *objective type questions. You are required to write the correct answer* **A, B, C** or **D** *in* **blue** *or* **black** *ink against each question in the box at the right hand side.*

Section **B** *contains* **10** *structured questions. Answers are to be written in the spaces provided on this question paper.*

Mathematical tables and silent non-programmable calculators may be used.

Acceleration due to gravity, g = 10 ms^{-2}.
Specific heat capacity of water = 4200Jkg^{-1} K^{-1}

For Examiners' use only

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

Turn Over

SECTION A (40 MARKS)

Answer **all** *the questions in this section*

1. A hydraulic brake works on the principle of
   A. transmission of pressure in a liquid.
   B. existence of viscosity in a liquid.
   C. distribution of force in a liquid.
   D. high density of a liquid.

2. Which **one** of the following is a derived unit?
   A. second.
   B. metre.
   C. mole.
   D. newton.

3. When the nucleus of a radioactive atom emits an Alpha particle, the atomic number;
   A. remains the same.
   B. decreases by four.
   C. decreases by two.
   D. increases by one.

4. Which **one** of the following is **not** true about hard X–rays?
   A. Have high penetrating power.
   B. Have short wave length.
   C. Have long wave length.
   D. Have high frequency.

5. What happens to resistance of a conductor when its temperature is raised?
   A. increases.
   B. decreases.
   C. remains constant.
   D. increase and then decrease.

6. Notches and cracks spread more rapidly when a brittle material is under
   A. stress.
   B. compression.
   C. tension.
   D. strain.

7. A galvanometer reads 0.05A at full scale deflection and has a resistance of 2.0 Ω. Calculate the resistance that should be connected in series with it to convert it to a voltmeter which reads 15V at full scale deflection.
   A. 10 Ω.
   B. 980 Ω.
   C. 280 Ω.
   D. 298 Ω.

8. A bus carrying a heavy load on its rack is more un–stable when moving because
   A. its centre of gravity is raised.
   B. its total weight is increased.
   C. the friction on the ground is increased.
   D. the pressure on the tyres is increased.

9. A radiactive nuclide has a half–life of 2 days. After 14 days, only 1g remained. What was the initial mass of a radioactive substance?
   A. 64g.
   B. 2g.
   C. 128g.
   D. 32g.

10. Which of the following is best when shaving?
    A. convex mirror.
    B. convex lens.
    C. concave mirror.
    D. plane mirror.

11. Alternating current is preferable to direct current for the transmission of power because;

A. it can be rectified.
B. it is easier to generate.
C. thinner conductors can be used.
D. it is safer.

12. Which of the following observations are most likely to happen when two bodies collide elastically?

(i) Linear momentum is conserved.
(ii) Kinetic energy before collision is equal to kinetic energy after collision.
(iii) Both linear momentum and kinetic energy are not conserved.

A. (ii) only.
B. (i) and (ii) only.
C. (ii) and (iii) only.
D. (i), (ii) and (iii) only.

13. The mass of a piece of metal is 1200g. A measuring cylinder contains $150cm^3$ of water. The piece of metal is put into the measuring cylinder. The water level rises to $250cm^3$ and covers the metal. What is the density of the metal in kgm^{-3}?

A. $\frac{250-150}{1200}$
B. $\frac{1200}{250-150}$
C. $\left(\frac{250-150}{1200}\right) \times 1000$
D. $\left(\frac{1200}{250-150}\right) \times 1000$

14. A bar magnet is pushed into a coil connected to a sensitive ammeter as shown in figure 1; until it comes to rest inside the coil.

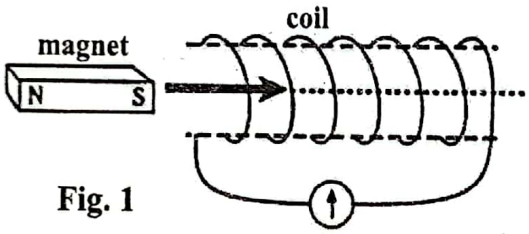

Fig. 1

Why does the ammeter briefly shows a non-zero reading?
A. The magnetic flux linkage in the coil increases then decreases.
B. The magnetic flux linkage in the coil increases then becomes constant.
C. The magnetic flux linkage in the coil decreases then increases.
D. The magnetic flux linkage in the coil decreases then becomes constant.

15. How much power is consumed by a boy who walks up the staircase of 20m with a force of 600N in 8 minutes?

A. 25W
B. 240W
C. 16W
D. 17.5W

16. Figure 2 below shows the positions of waves within part of the electromagnetic spectrum.

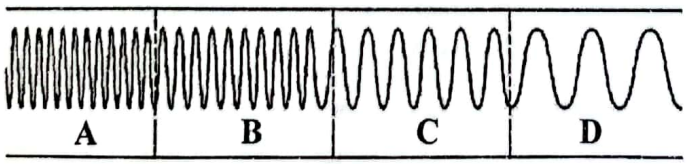

Fig. 2

Which position is most likely to be of infrared radiations?

17. A particle moves from A to B with a velocity of $20ms^{-1}$ and moves back from B to A with a velocity of $30ms^{-1}$. Find the average velocity of the particle.
A. 24 ms^{-1}.
B. 25 ms^{-1}.
C. Zero
D. 20 ms^{-1}.

18. Local action in a battery is indicated by
(i) excessive gassing under load conditions.
(ii) excessive drop in the density of electrolyte.
(iii) impurities present in zinc rod.
A. (iii) only.
B. (i) and (ii) only.
C. (ii) and (iii) only.
D. (i), (ii) and (iii).

19. A transverse wave has an amplitude of 2.4m. What is the vertical distance in metres between the top of a crest and the bottom of a trough.
A. 1.2.
B. 4.8.
C. 2.4.
D. 3.6.

20. Which of the following statements is false? The pressure at a given depth in a fluid
A. is equal in all directions.
B. is independent of the shape of the container.
C. acts at right angles to the surface containing the fluid.
D. depends on the area of the surface.

21. A power of 100W is supplied to an electric motor to operate a pump which raises 0.9kg of water through 10m every second. What is the efficiency of the pump?
A. 90%.
B. 100%.
C. 80%.
D. 50%.

22. A bullet of mass 0.006kg travelling at $120ms^{-1}$ penetrates deeply into a fixed target and is brought to rest in 0.01s. Calculate the distance of penetration into the target.
A. 6×10^{-1} m.
B. 1.2×10^{3} m.
C. 6×10^{0} m.
D. 1.2×10^{0} m.

23. When converting a galvanometer into an ammeter,
A. a shunt is connected in series with the galvanometer.
B. a multiplier is connected in series with galvanometer.
C. a shut is connected in parallel with the galvanometer.
D. a multiplier is connected in parallel with the galvanometer.

24. An object 9mm tall is placed 12cm infront of a convex lens. A real image of the object, 18mm tall is produced by the lens. Calculate the distance of the image from the lens.
A. 30cm.
B. 27cm.
C. 24cm.
D. 21cm.

25. Which **one** of the following radiations is emitted by hot bodies?
A. Visible light.
B. Gamma radiations.
C. X – rays.
D. Black body radiations.

26. A body of mass 18000g is risen through a height of 6m. Find the workdone.

A. $\frac{18000\times10}{6\times1000}$. B. $\frac{18000\times6}{1000\times10}$

C. $18\times6\times10$. D. $\frac{6\times1000}{18000\times10}$.

27. The maximum constant velocity attained by a body moving in a viscous fluid is called?

A. Uniform velocity. B. Terminal velocity.

C. Turbulent velocity. D. Constant velocity.

28. Figure 3 shows a cross(+), placed 12cm and 9cm from plane mirrors M_1 and M_2 respectively.

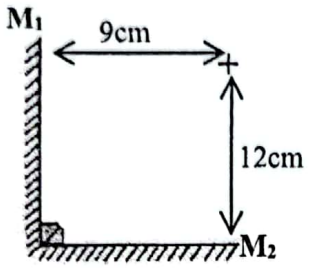

Fig. 3

The distance between the images formed by the two mirrors is

A. 3cm. B. 21cm.

C. 30cm. D. 84cm.

29. The symbol $^{235}_{92}U$ denotes a uranium nuclide. Which of the following statements are true.

(i) The atomic number of Uranium is 235.

(ii) The mass number of Uranium is 235.

(iii) The number of neutrons in Uranium is 143.

A. (i) only. B. (i) and (ii) only.

C. (ii) and (iii) only. D. (i), (ii) and (iii).

30. The cost of electricity in Kenya shillings is sh.150 per unit. If in a certain month, Mr. Rajab paid sh.30,000 as his monthly bill for electricity, find the number of units of electricity consumed by Mr. Rajab during the month.

A. 100kWh. B. 150kWh.

C. 200kWh. D. 250kWh.

31. Figure 4 shows the variation of temperature with time for a sample of a solid.

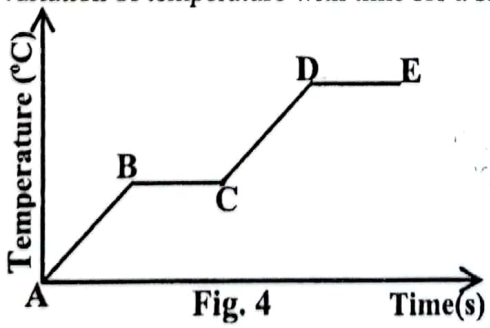

Fig. 4

Which of the following best explains what is happening along **BC**?

Turn Over

A. The temperature of the solid is rising.
B. The solid is changing to liquid at constant temperature.
C. The temperature of the formed liquid is constant.
D. The liquid is condensing along BC.

32. The ciliary muscles of the human eye relax when viewing;
A. nearby objects. B. objects in dim light.
B. distant objects. D. objects in bright light.

33. Which of the following best describes a diesel engine?
A. Injector, no spark plug, higher efficiency.
B. Injector, spark plug, lower efficiency.
C. Carburettor, spark plug, lower efficiency.
D. Carburettor, no spark plug, higher efficiency.

34. Which of the following devices changes light energy to electrical energy?
A. Thermopile. B. Immersion heater C. Photo cell. D. Nuclear reactor.

35. A fuse in electrical appliances must always be connected in series with;
A. a neutral wire. B. an earth wire.
C. a live wire. D. a lightening conductor.

36. The drying action of towels bases on;
A. Surface tension. B. Capillary.
C. Diffusion. D. Brownian motion.

37. A radio–active nuclide which decays by emitting a beta particle gives rise to a stable nuclide;
(i) with the same mass number as the radio–active nuclide.
(ii) with the same atomic number as the radio–active nuclide.
(iii) with an atomic number which exceeds that of the parent nuclide by one.

A. only (i) B. only (i) and (iii) C. only (i) and (ii) D. only (iii)

38. Figure **5** shows a method of magnetising a steel rod, **PQ** using the divided touch method.

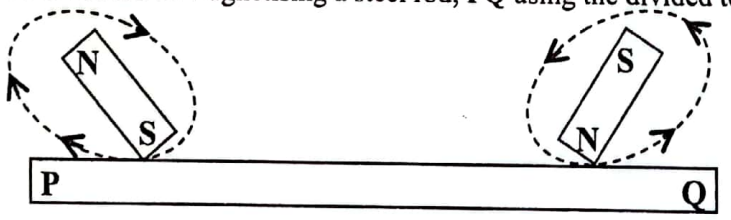

Fig. 5

The polarities near the ends **P** and **Q** will be;

	Polarity of **P**	Polarity of **Q**
A.	N – pole	S – pole
B.	S – pole	N – pole
C.	N – pole	N – pole
D.	S – pole	S – pole

39. Which **one** of the following condition(s) is / are obeyed by a body in equilibrium under a set of parallel forces?

(i) obeys the principle of moments
(ii) balances at its centre of gravity
(iii) sum of forces to one side is equal to the sum of forces to the opposite side.

A. (i) and (iii) only
B. (ii) and (iii) only
C. (i) and (ii) only
D. (i), (ii) and (iii) only

40. Some machines operate at a mechanical disadvantage. This means that;

A. one applies an effort bigger than the load.
B. such machines have a mechanical advantage greater than 1.
C. one applies a small effort to overcome a bigger load.
D. such machines provide a very low speed for the load.

SECTION B (40 MARKS)

Write in the spaces provided

41. (a) State the law of **floatation**? *(01 mark)*

.....

.....

(b) State **two** applications of the law of floatation, *(02 marks)*

(i) .....

(ii) .....

(c) Why does an object in water need a buoyant force? *(01 mark)*

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42. (a) What is **pressure?** *(01 mark)*

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(b) How does the pressure exerted by a solid differ from that exerted by a fluid? *(02 marks)*

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(c) The pressure of water on the ground floor is 40,000 Pa and on the first floor is 10,000 Pa. Find the height of the first floor. *(02 marks)*

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43. (a) What is meant by **critical angle** for light moving from **one** medium to another? *(01mark)*

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(b) Why does the sun appear red at sunset and at sunrise? *(02 marks)*

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(c) Name **one** medical instrument that utilizes total internal reflection. *(01 mark)*

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44. (a) What is **evaporation?** *(01 mark)*

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(b) Explain why spirit poured on a hand makes the hand feel cool. *(02 marks)*

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(c) Give **one** application of cooling produced by evaporation. *(01 mark)*

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45. (a) What are **longitudinal waves**? *(01 mark)*

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(b) Figure **6** shows plane waves sent out by a ripple tank vibrator.

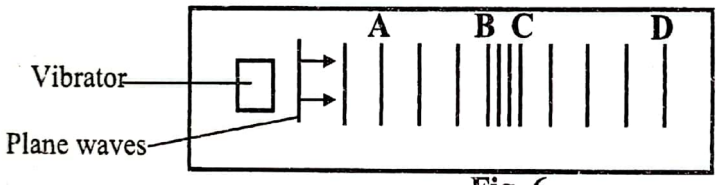

Fig. 6

Explain why the water waves have higher speed and a longer wave length in section **AB** and **CD** than when in section **BC**. *(02 marks)*

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(c) Give **one** example which shows that the speed of a wave depends on the medium in which it travels. *(01 mark)*

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46. (a) (i) Why is electric power first stepped up before transmission? *(01 mark)*

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(ii) State **one** disadvantage of electric transmission at high voltages. *(01 mark)*

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(b) A house has one **60W** bulb and two **30W** bulbs. Find the cost of having all the bulbs switched on for 2 hours every day for 30 days at a cost of UGX. 650 per unit. *(02 marks)*

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47. (a) What is a **girder**? *(01 mark)*

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(b) Figure 7 shows a structure with different girders.

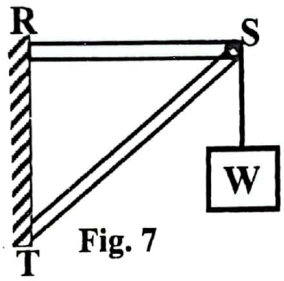

Fig. 7

Identify the girder under tension and under compression. *(02 marks)*

under tension.....

under compression.....

(c) Why are triangular shapes commonly used in structure designs? *(01 mark)*

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48. (a) What is a **transformer**? *(01 mark)*

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(b) A transformer has 800 turns in its primary coil and 3200 in its secondary coil. If it is connected to an alternating voltage of 240V, what is the output voltage? *(03 marks)*

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Turn Over

9. (a) State the **domain theory** of magnetism. *(01 mark)*

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(b) Explain why a magnet left alone for long weakens. *(02 marks)*

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(c) Sketch the magnetic field pattern due to a straight conductor carrying current out of the plane of a paper. *(02 marks)*

10. (a) What is a **radioactive nuclide**? *(01 mark)*

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(b) List **two** dangers that may arise when someone is exposed to radioactive materials. *(02 marks)*

(i) .....

(ii) .....

(c) Nuclide **X** decays to **Q** according to the equation below.

$${}^{A}_{Z}\mathbf{X} \rightarrow {}^{A}_{Z+1}\mathbf{Q} + \mathbf{t}.$$ Identify t. *(01 mark)*

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END