Candidate's Name

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Signature:…….....

Random No.						Personal No.		

535/1

PHYSICS

Paper 1

July 2022

2¼ hours

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Write your name, signature and personal number clearly in the spaces above.

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

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

Mathematics tables and silent non – programmable calculators may be used.

Assume where necessary:

Acceleration due to gravity = $10ms^{-2}$

Specific heat capacity of water = 4200 Jkg^{-1} K^{-1}

Specific heat capacity of copper = 400 Jkg^{-1} K^{-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: (40 MARKS)

Answer **all** *questions from this section.*

1. The rate at which work is done is known as
   A. watts. B. power. C. Joules. D. work done

2. Alcohol is **ideal** for measuring low temperatures simply because
   A. it does not solidify easily. B. it has a higher expansivity.
   D. C. it wets glass. D. it is a poor conductor of heat.

3. 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. 0.48N C. 0.68N D. 0.80N

4. In the wet leclanche cell, the carbon powder
   A. increases the conducting surface of the carbon rod.
   B. connects the carbon rod to the zinc rod.
   C. acts as an electrolyte.
   D. prevents polarization.

5. An ungraduated thermometer is attached to a centimetre scale and reads 7.5 cm in pure melting ice, 23.5 cm in steam at 100^oC and 5.5 cm in a body. What is the temperature of the body?
   A. -23.4°C B. -12.5°C C. 12.5°C D. 34.4°C

6. The term accommodation, as applied to the eye refers to its ability to
   A. control the light intensity falling on the retina.
   B. distinguish between different colours.
   C. vary the distance between the lens and the retina.
   D. vary the focal length of the eye lens.

7. The leaf of a charged gold – leaf electroscope gradually collapse with time due to
   A. presence of charged particles of same sign of charge as on the electroscope.
   B. presence of magnetic field around it.
   C. leakage of charge to the surrounding.
   D. variation in atmospheric pressure.

8. An element X has an atomic mass of 239 and atomic number of 92. It emits a beta particle thus forming an element Q. The element Q can be represented by:
   A. ${}^{235}_{90}Q$ B. ${}^{239}_{91}Q$ C. ${}^{238}_{92}Q$ D. ${}^{239}_{93}Q$

9. A mark at the bottom of a cylinder appears to be displaced upwards a distance of 6.2 cm when a liquid is poured into the cylinder to a depth of 19.4 cm. What is the refractive index of the liquid?

A. 0.32 B. 1.37 C. 1.46 D. 2.13 ☐

10. Which of the following controls the brightness of the screen of the cathode ray oscilloscope? The

A. anode potential.
B. grid potential.
C. current through the filament.
D. time – based circuit. ☐

11. Which of the following is true when water waves move from a deeper end towards a shallow end?

(i) Their wavelength decreases.
(ii) Their velocity decreases.
(iii) Their frequency decreases.

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

12. In the circuit diagram shown in Figure 1, calculate the total resistance of the circuit.

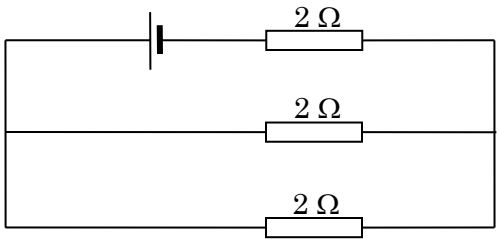

Figure 1

A. 0.67Ω
B. 1.5 Ω
C. 3 Ω
D. 6 Ω ☐

13. An object of mass 4 kg is dropped from an aeroplane at a height of 15000m. The object experiences a frictional force of 30N. Calculate the force at which the body strikes the ground.

A. 10N B. 70N C. 200N D. 600N ☐

14. Three optical media *U*, *V* and *W* of refractive indices n_1, $n_2$and $n_3$respectively, are separated by parallel boundaries. A ray of light passes through the media as shown in figure 2.

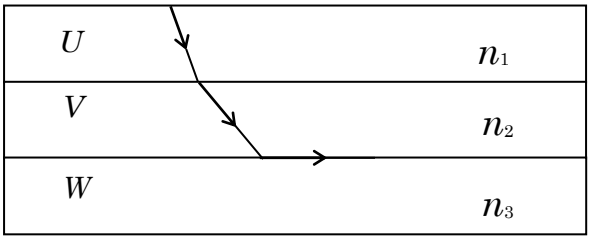

Figure 2

Which of the following is the ascending order of their refractive indices?
A. n_1, $n_2$andn_3 *B.* n_1, $n_3$andn_2 C.n_3, $n_1$andn_2 D. n_3, $n_2$andn_1

15. A stone projected vertically upwards takes 10s to return the point of projection. The maximum height attained is

A. 100m B. 375m C. 1000m D. 1500m

16. 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.

17. A rod of cross-sectional area 40 cm^2 needs a tensile force of 2N to break it. What is the breaking stress?
A. 0.005 Nm^{-2} B. 0.05 Nm^{-2} C. 5 Nm^{-2} D. 500 Nm^{-2}

18. A ray of white light is incident on yellow filter as shown in Figure 3.

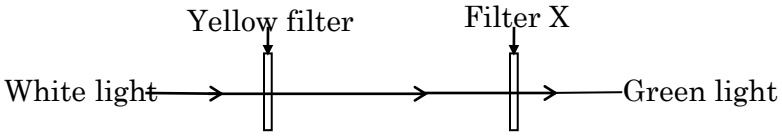

Figure 3

If green light is observed after filter X, then X is either green or
A. magenta. B. cyan. C. red. D. white.

19. A measuring cylinder contains 8 cm^3 of water. A small piece of an irregular object of mass 24g is lowered carefully into the measuring cylinder so that it is completely submerged. If the density of the object is 8gcm^{-3}, then the new reading of the level of water in the cylinder is
A. 8.3 cm^3 **B.** 11 cm^3 C. 32 cm^3 D. 40 cm^3

20. An object is acted on by a retarding force of 10N and at a particular instant; its kinetic energy is 6J. The object will come to rest after it has travelled a further distance of
A. 0.6m B. 1.7m C. 4m D. 60m

21. What happens to the molecules of boiling water? The molecules
A. lose energy. C. become lighter.
B. expand. D. move further apart.

22. The electrical resistance of a metallic conductor
(i) increases when temperature rises.
(ii) is directly proportional to the cross – sectional area of the wire.

(iii) depends on the material from which the wire is made.

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

23. A uniform metre rule pivoted at the 25 cm mark balances when a mass of 0.15 kg is hung at the 8 cm mark. What is the mass of the metre rule?

A. 0.048 kg B. 0.102 kg C. 0.20 kg D. 1.02 kg

24. The diagram in figure 4 shows a bimetallic strip wound on a flat spiral. Metal X has a higher expansivity than metal Y. When the strip is heated, then its

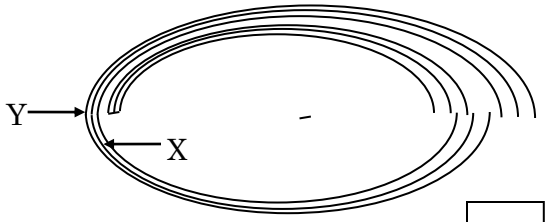

Figure 4

A. curvature increases as it coils further.
B. curvature decreases as it uncoils.
C. shape remains the same.
D. mass increases.

25. In sound waves, the particles of the medium
A. are stationary.
B. move along with the wave.
C. vibrate at right angles to the direction of the wave.
D. vibrate in the same direction as the wave.

26. A sea breeze occurs
A. when cool air blows towards land.
B. when warm air blows towards the land.
C. during night.
D. when cool air blows towards sea.

The diagram above shows two perpendicular forces acting on an object of mass 5 kg. Find the magnitude of the acceleration of the object.

A. 1 m s^{-2}
B. 2 m s^{-2}
C. 10 m s^{-2}
D. 25 m s^{-2}

28. The energy transformation that takes place when an electrophorus is used to charge a metal is

A. electrical to mechanical.
B. mechanical to electrical.
C. mechanical to heat.
D. heat to mechanical.

29. In a four stroke internal combustion engine, the work required for initial induction and compression comes from

A. spark plug.
B. movement of steering wheel.
C. rotational kinetic energy stored in the fly-wheel.
D. separate starter motor.

30. A sound wave of frequency 200Hz is produced 300m away from a high wall. If an echo is received at the place of production of sound after 2s, the wavelength of the sound wave is

A. 1.2m B. 1.5m C. 2.4m D. 3m

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

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

32. Figure 5 is a set up to demonstrate a step – down transformer.

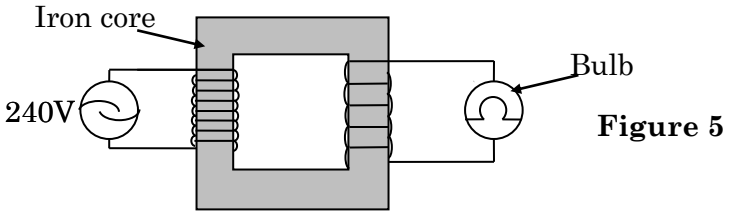

Figure 5

The lamp would glow more brightly if the

A. number of turns on the secondary is reduced.
B. iron core is replaced by copper.
C. number of turns on the primary coil is reduced.
D. number of turns on the primary is increased.

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

A. Transformer B. Motor C. Heater D. Diode

34. The e.m.f. induced in a coil of wire which is rotating in a magnetic field does not depend on

A. angular velocity of rotation.
B. resistance of the coil.
C. area of the coil.
D. number of turns of the coil.

35. The force which acts towards the centre and keeps a body in a circular path is called:

A. centrifugal force.
B. gravitational force.
C. centripetal force.
D. frictional force.

36. Which of the following would cause production of hard X-rays?

A. Increasing the p.d. across the tune.
B. Increasing the filament current.
C. Using a heavy metal as a target.
D. Increasing the distance between the cathode and the target.

37. A cubical tank of side 2m is evacuated of air on a day when the atmospheric pressure is 10^5Pa. The crushing force exerted by the atmospheric pressure on the tank is

A. 4×10^5N 12×10^5N C. 18×10^5N D. 24×10^5N

38. Which of the following statements about a lightning conductor is **not** true?

A. It has a sharp point at its top end.
B. It must be insulated from the building.
C. Its lower end is buried in the earth.
D. Its top must be higher than the highest part of the building.

39. Two resistors are connected in parallel as shown in Figure 6.

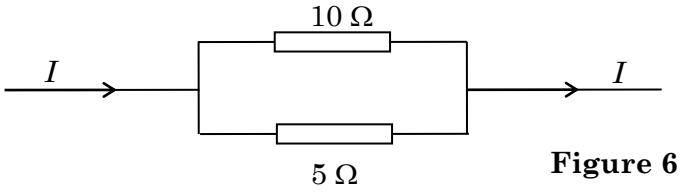

Figure 6

When current *I* is passes through the circuit, the power dissipated in the 5Ω resistor is 40W. What is the power dissipated in 10Ω resistor?

A. 80W B. 40W C. 20W D. 10W

40. A constant horizontal force is applied to a body initially at rest on a smooth horizontal table. Which of the following quantities will not change during the application of the force?

A. Position of the body.
B. The acceleration of the body.
C. The momentum of the body.
D. The velocity of the body.

SECTION B

Write your answers in the spaces provided.

41(a) State the principle of conservation of energy. (1 mark)

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(b)

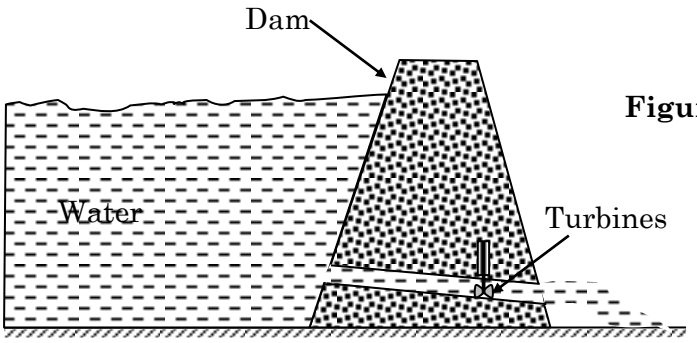

Figure 7

The Figure 7 shows a hydroelectric generating system.

State the energy transformations that occur during the generation of hydroelectric power in the correct order in which they occur.(2 marks)

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(c) Explain briefly the shape of the dam. (1 mark)

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42(a) What is an electric field? (1 mark)

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(b) In the space below, sketch the electric field pattern between two negative point charges at a small distance apart. (2 marks)

(c) Explain briefly why a dressing mirror may become more dusty if wiped with a dry cloth on a warm dry day. (1 mark)

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43(a) Define wave length as applied to wave motion. (1 mark)

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(b) The figure 8 represents a wave moving across the water surface from left to right.

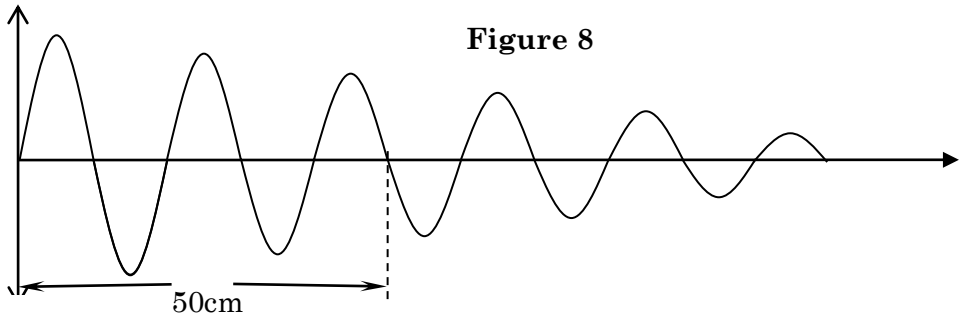

Figure 8

(i) Why does the height of the wave gets smaller as distance covered increases? (1 mark)

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(ii) If the frequency of the wave is 10Hz, how fast is it moving? (2 marks)

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44.(a) (i)State the principle of conservation of liner momentum. (1 mark)

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(ii) What is inertia? (1 mark)

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(b) A trolley of mass 0.1 kg moves horizontally with a velocity of $3ms^{-1}$. A body of mass 0.5 kg is dropped vertically at a speed of 2 ms^{-1} onto the trolley where it strikes to the trolley. Calculate the final velocity of the trolley after the body is dropped. (2 marks)

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45.(a) Define focal length of a lens? (1 mark)

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(b) In the space below, draw a ray diagram showing how a lens may be used as a magnifying glass. (2 marks)

(c) If the focal length of the lens drawn in (b) above is 5 cm, calculate its power. (1 mark)

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46(a) State **two** factors which affect the strength of an electromagnet. (2 marks)

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(b) Figure 9 shows a small bar magnet placed near an iron nail. Describe what happens to the bar magnet when the switch K is closed. (2 marks)

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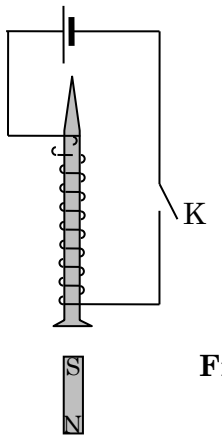

Figure 9

47(a) Define specific heat capacity of a substance. (1 mark)

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(b) An aluminium block of mass 0.5 kg is heated by an electrical heater of power rating 40W embedded in it. In one minute the temperature of the block rose from 15°C to 19°C.

(i) Calculate the specific heat capacity of the aluminium. (2 marks)

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(ii) State one assumption made in (a) (i) above. (1 mark)

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48(a) What are cathode rays? (1 mark)

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

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(c) State one application of radioactive tracers in:

(i) medicine (1 mark)

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(ii) agriculture (1 mark)

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49. Figure 10 shows a test tube floating vertically in water with ⅓ of its volume submerged. The total mass of the test tube and the mercury is 0.068kg.

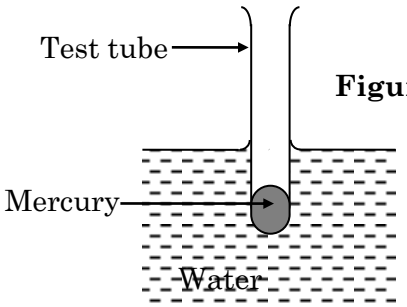

Figure 10

(a) Calculate the volume of the water displaced by the test tube. (2 marks)

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(b) Find the volume of extra mercury which should be added into the test tube so that it is fully submerged; given that density of mercury is 13600 kgm^{-3}.
(2 marks)

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50. The circuit in Figure 11 is set up to measure the value of resistor R.

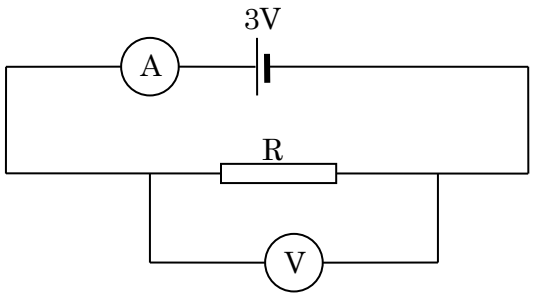

Figure 11

(a) Explain briefly why the voltmeter Vis connected across R. (1 mark)

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(b) If the ammeter reads 0.50A and the voltmeter read 2.8V, calculate:

(i) the value of R. (1 mark)

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(ii) the internal resistance of the battery. (2 marks)

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E N D