Candidates Name

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Signature.....

Random N0.						Personal N0.		

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

535/1

PHYSICS

Paper 1

July/August 2022

2¼ hours

TORORO ARCHDIOCESE EXAMINATIONS BOARD

Uganda Certificate of Education

MOCK EXAMINATIONS 2022

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 on the right hand side.*

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

Do ***not*** *use pencil except for drawings. Any work done in pencil will* ***not*** *be marked.*

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

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

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

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

1. A space rocket is able to accelerate through a vacuum due to
   A. conservation of linear momentum
   B. conservation of energy
   C. conservation of inertia
   D. absence of gravity

2. A temperature of 80□ is the same as
   A 193 K
   B 273 K
   C 353 K
   D 453 K

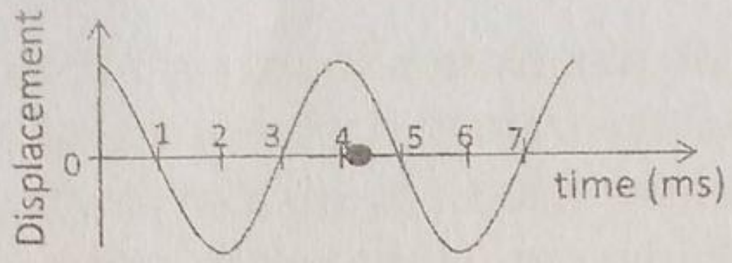
3. What is the mechanical advantage of a wheel and axle system whose efficiency is 80%, if the wheel is of radius 40 cm and the axle of is radius 10 cm?
   A. 4.0
   B. 3.2
   C. 2.0
   D. 8.0

4. Pinhole cameras cannot be used to photograph moving objects because
   A pinhole cameras form inverted images only
   B pinhole cameras require a long exposure time
   C pinhole cameras do not have lenses
   D pinhole cameras form diminished images only

5. Which of the following pairs of metals consist of only ferromagnetic substances only?
   A nickel and copper
   B cobalt and copper
   C cobalt and iron
   D nickel and steel

6. Which of the following statements is true when a body floats in a fluid?
   A. the fluid upthrust is greater than the body's weight
   B. the fluid upthrust is less than the body's weight
   C. the fluid upthrust is equal to the body's weight
   D. the fluid upthrust vanishes

7. Which of the following symptoms is not by exposure to nuclear radiations?
   A cancer
   B sun-tan
   C genetic disorders
   D eye cataract

8. 

The graph shows how the displacement of the air molecules varies with time as a sound wave passes. The frequency of the sound wave is

A 125 Hz
B 250 Hz
C 500 Hz
D 750 Hz

9. A stone is projected vertically upwards from the ground into air with an initial velocity of 12 ms^{-1}. What is the speed of the stone when at a height of 7 m from the ground?

A. 5 ms^{-1}
B. 10 ms^{-1}
C. 4 ms^{-1}
D. 2 ms^{-1}

10. A concave mirror forms a real, inverted image of the same size as its object. Which of the following correctly describes the correct position of the object in front of the mirror?

A between the pole and the principal focus
B at the principal focus
C between the principal focus and the centre of curvature
D at the centre of curvature

11. When a beam of fast moving electrons strikes the surface of a metal; the radiation that are produced include

(i) heat
(ii) X-rays
(iii) γ-rays

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

12. Which of the following lists consists of consist of primary sources of energy only?

A. battery, coal, sun
B. wood, wind, dynamo
C. tides, biomass, steam
D. sun, wind, natural gas.

13. A ray of light incident on a plane mirror makes an angle of 36° with the mirror. The angle between the incident ray and the reflected is

A. 36°
B. 72°
C. 54°
D. 108°

14. The e.m.f of an electric cell can be measured roughly by

A. connecting a low resistance voltmeter across the cell
B. connecting a high resistance ammeter in series with the cell
C. connecting a low resistance ammeter in series with the cell
D. connecting a high resistance voltmeter across the cell

15. Which of the following statements is true about the work done by a force?

(i) it is measured by the product of the force and the distance moved in the direction of the force
(ii) it is measured in joules
(iii) it is equal to the energy change which occurs

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

16. An ice-cream making machine is rated 240 V, 3.0 kW. The machine is operated from a 240 V mains supply for 30 minutes. What is the cost of running the machine for that time if electrical energy costs Shs 800 per unit?

A Shs 6400
B Shs 1200
C Shs 7200
D Shs 9600

17. When an echo-sounding method is used for finding the depth of a sea, 2.0 seconds elapse between the signal leaving and the echo being received back at the ship. If the velocity of sound in the sea water is 1600 ms^{-1}, what is the depth of the sea at this point?

A 1600 m
B 400 m
C 800 m
D 3200 m

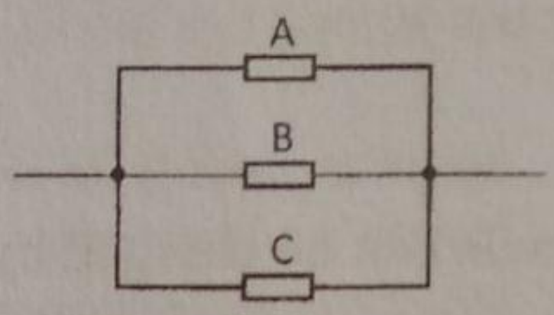
18. The process by which heat energy moved along with the transmitting medium is called?

A evaporation
B conduction
C convection
D radiation

19. An approximate value of the size of a molecule can be obtained by

A. measuring the height to which water rises in a fine capillary tube
B. observing Brownian motion of smoke particles
C. measuring the radius of the circle into which a known volume of an oil drop spreads on a water surface
D. measuring the frictional force between the molecules of a solid

20.



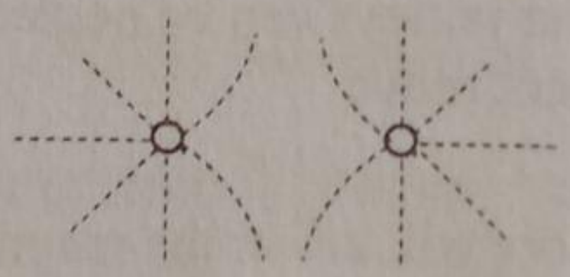
The effective resistance of the resistor network shown is 1.0 Ω. If the resistances of A and B are 2.0 and 3.0 Ω respectively, what is the resistance of C?

A 5.0 Ω
B 6.0 Ω
C 2.2 Ω
D 1.0 Ω

21. A block of material of density 2400 kgm^{-3} has a volume 0.20 m^3. What is its weight on the surface of the earth?

A. 480 N
B. 1200 N
C. 2400 N
D. 4800 N

22.



The diagram shows the electric field pattern due to two charged particles close to each other. Which of the following statements is true about the charges on the particles?

A the particles carry unlike charges
B the force due to the charges is attractive
C the charges will neutralise each other when brought together
D the force between the charges is repulsive

23. At certain engine speeds, the windows and the fixtures of a bus rattle violently. This is an example of

A interference
B resonance
C attenuation
D beats

24. Oil is used as a lubricant in machines because it has

A. high viscosity
B. low viscosity
C. low density
D. high pressure

25. Which of the following materials can be charged by electrostatic induction?

A ebonite
B glass
C aluminium
D rubber

26. Water is more effective than most other liquids for use in car radiators to absorb heat produced in the car engine because

A water is readily available
B water has a high specific heat capacity
C water has a high boiling point
D water has a low specific heat capacity

27. The mechanical advantage of a single rope 4-pulley system is less than 4 because

A the mechanical advantage is less than the velocity ratio
B friction acts on the pulleys
C the weight of the lower pulleys can be neglected
D the upper pulleys do not move

28. Which of the following factors will affect the magnitude of the e.m.f induced across the output of a d.c electric generator?

(i) speed of rotation of the armature
(ii) the strength of the magnetic field
(iii) the number of turns in the coil
(iv) the resistance of the coil windings

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

29. The following are applications of concave mirrors except

A telescopes
B search lights
C shaving mirrors
D driving mirrors

30. A force of 10 N, acts continuously, increases the kinetic energy of an object from 20 J to 60 J. The distance moved by the object is then

A 2 m
B 6 m
C 4 m
D 5 m

31. The correct sequence of the strokes in the four-stroke internal combustion engine is

A intake, compression, power, exhaust
B exhaust, intake, compression, power
C intake, power, compression, exhaust
D compression, power, exhaust, intake

32. Which of the following electromagnetic waves has the longest wavelength?

A radio waves
B infra-red waves
C ultraviolet waves
D gamma rays

33. A ball is swung round in a horizontal circle with a constant speed. Which of the following statements correctly describes the motion of the ball?

A the velocity of the ball is uniform
B the velocity of the ball is directed towards the centre of the circle
C the velocity of the ball is directed away from the centre of the circle
D the velocity of the ball is non-uniform

34. The nucleus of the radium atom $^{226}_{88}Ra$ has

A 138 protons and 88 neutrons
B 88 protons and 138 neutrons
C 226 protons and 88 neutrons
D 88 protons and 226 neutrons

35. The frequency of the sound produced by the horn of a truck lorry is 680 Hz. If the speed of sound in air is 340 ms^{-1}; what is the wavelength of the sound?

A 2.0 m
B 0.5 m
C 4.0 m
D 5.0 m

36. A transformer having 2000 turns in its primary and 100 turns in the secondary winding is used to step down 240 V a.c mains. The output voltage of the transformer is

A 12 V
B 24 V
C 20 V
D 240 V

37. A car of mass 1500 kg; moving at a steady speed of 20 ms^{-1} is brought to rest uniformly by a breaking force of 7500 N. Calculate the breaking distance.

A 40 m
B 20 m
C 30 m
D 10 m

38. When a cell of internal resistance 2 Ω is connected to an external resistance of 10 Ω; the potential difference across the 10 Ω resistance is found to be 6.0 V. What is the e.m.f of the cell?

A 4.8 V
B 7.2 V
C 10.4 V
D 6.0 V

39. When heat is supplied at a constant rate of 530 W, it takes 5.0 minutes to melt 0.5 kg of ice at 0□ to water at the same temperature. Calculate the specific latent heat of ice

A 31800 J kg^{-1}
B 5300 J kg^{-1}
C 1060 J kg^{-1}
D 2650 J kg^{-1}

40. The deflection system of a cathode ray oscilloscope comprises of

A anodes; cathode and the grid
B X-plate and the Y-plate
C fluorescent screen and graphite coating
D vacuum and voltage supplies

SECTION B (40 Marks)

Answer **all** questions in this section

41. (a)(i) What is meant by linear momentum? (01 mark)

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(ii) State the law of conservation of linear momentum (01 mark)

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(b) Name **two** practical applications of the principle of conservation of linear momentum. (02 marks)

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42. (a) What is meant by a **short circuit** as applied to a battery? (01 mark)

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(b) A 5Ω resistor is connected across the terminals of a cell of e.m.f 1.5 V, and internal resistance 1.0 Ω. Calculate the rate of heat production inside the cell when it is short-circuited. (03 marks)

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43. (a)(i) What are **primary** colours? (01 mark)

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(ii) Give **two** examples of primary colours (01 mark)

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(b)(i) What is meant by a **pure spectrum**? (01 mark)

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(ii) Name the colour which is deviated most when the spectrum of white light is formed by a prism. (01 mark)

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44. (a) State **Archimedes' principle.** (01 marks)

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(b) A balloon filled with 40 m^3 of hydrogen gas weighs 36 kg. the balloon is held in place by a rope fixed to the ground. If the density of the surrounding air is 1.2 kgm^{-3}, find the upthrust on the balloon.
(03marks)

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45. (a)(i) What is meant by a step-down transformer? (01 mark)

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(ii) Name one electric device inside which you expect to find a step-down transformer. (01 mark)

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(b) State **two** reasons why transformers are not 100% efficient.
(02 marks)

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46. (a) Define the following terms as applied to machines.

(i) Efficiency (01 mark)

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(01 mark)

(ii) Mechanical advantage

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(b) A wheel and axle system consists of a wheel of radius 50 cm, and an axle of radius 10 cm. Calculate the velocity ratio of the system. (02 marks)

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47. (a) Define specific latent heat vaporisation and state its unit. (02 marks)

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(b) Calculate the quantity of heat needed to raise the temperature of 5 kg of water by 10□. (02 marks)

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48. (a)(i) What is meant by acceleration due to gravity? (01 mark)

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(ii) Give **one** reason why the acceleration due to gravity has a different value on the surfaces of different planets. (01 mark)

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(b) A stone of mass 0.1 Kg is thrown vertically upwards with an initial velocity of 20 ms^{-1}. Calculate the maximum height attained. (02 marks)

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49. (a)(i) What is meant by an echo? (01 mark)

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(ii) Name **one** application of echoes in medicine. (01 mark)

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(b) A water wave has a frequency of 20 Hz and wavelength of 2.0 cm. Calculate the frequency of the wave. (02 mark)

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50. (a) Explain the meaning of each of the following terms as applied to radioactivity.

(i) Radioactive disintegration (01 mark)

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(ii) Half-life (01 mark)

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(b) A radioactive atom with atomic number 92 and mass number 238 emits a particle. As a result, the mass number falls to 234.

(i) Name the particle emitted. (01 mark)

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(ii) State the atomic number of the remaining atom. (01 mark)

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END