Name:..... Centre/Index No.....

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535/1
PHYSICS
Paper 1
July/August, 2023
2 ¼ hours

ASSHU ANKOLE JOINT MOCK EXAMINATIONS 2023
Uganda Certificate of Education
PHYSICS
Paper 1
2 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

- *Write your name, signature, centre and index number clearly in the space 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.*

Where necessary, assume

- Acceleration due to gravity, g = $10ms^{-2}$
- Density of water = $100Kgs^{-3}$
- Speed of sound in air = $330ms^{-1}$
- Specific heat capacity of water = $4200JKg^{-1}K^{-1}$
- Specific heat capacity of aluminium = $900Jkg^{-1}k^{-1}$

For Examiners' Use Only

Q.41	Q42	Q43	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 force which keeps a body in circular motion is called
   A. Centrifugal force
   B. Centripetal force
   C. Tensional force
   D. Gravitation force

2. Which one of the following is a derived unit?
   A. Metre
   B. newton
   C. second
   D. kilogram

3. Constructive interference in a ripple tank occurs when;.....
   A. a crest overlaps with a crest
   B. the wave is stationary
   C. a crest overlaps with a trough
   D. the wave strikes a barrier

4. Aspherical ball has a radius of 3cm. find its volume in m^3.
   A. $\frac{4\times10^6}{27\times\pi}$
   B. $\frac{4\pi\times10^6\times3}{27}$
   C. $\frac{\pi\times27}{4\times10^3}$
   D. $\frac{4\pi\times27}{3\times10^6}$

5. An object is placed between the focal point and centre of curvature of a concave mirror. Which of the following fully describes the nature of the image formed?
   A. Real, inverted, diminished
   B. Real, erect, diminished
   C. Real, inverted, magnified
   D. Virtual, erect, magnified

6. Which one of the following atoms are isotopes?
   A. ${}^{30}_{16}X$ *and* ${}^{32}_{16}Y$
   B. ${}^{16}_{8}X$ *and* ${}^{16}_{7}Y$
   C. ${}^{28}_{14}X$ and ${}^{30}_{16}Y$
   D. ${}^{19}_{9}X$ and ${}^{40}_{19}Y$

7. All electromagnetic waves
   A. Highly penetrate matter
   B. Produce ionization in gases
   C. Cause heating effect when absorbed by matter
   D. Do not require any material medium for transmission.

8. The short hand method of writing very big or small numbers in powers of ten is called;
   A. Estimation
   B. Standard form
   C. Rounding off
   D. Significant figures

9. Hooke's law states that the extension produced on an elastic material is
   A. Directly proportional to the force applied provided elastic limit is not exceeded.

B. Directly proportional to the force applied provided elastic limit is exceeded.
C. Inversely proportional to the force applied provided elastic limit is exceeded.
D. Inversely proportional to the force applied provided elastic limit is not exceeded.

10. The spreading out of waves when they pass through a gas or around a sharp corner is known as
A. Refraction
B. Reflection
C. Diffraction
D. Interference

11. A soft magnetic material is the one which
A. can break easily
B. can be magnetized easily
C. is weakly attracted by a magnet
D. can retain its magnetism for a long time

12. A spanner of length 20cm is used to tighten a nut. If a force of 50N is applied at right angles to the end of the spanner. Find the moment of the applied force.
A. $(20 \times 50)Nm$
B. $\left(\frac{100 \times 50}{20}\right)Nm$
C. $\left(\frac{100 \times 50}{20}\right)Nm$
D. $\left(\frac{20 \times 50}{100}\right)Nm$

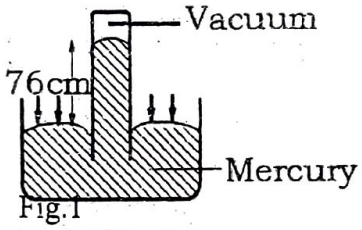
13. 

Fig.1

Figure 1 shows a simple barometer. The height of the mercury column is 76cm. when the tube is slightly tilted, the height of the mercury column will.
A. not change
B. be lower than 76 cm
C. oscillate about 76 cm
D. be slightly higher than 76cm

14. Calculate the quality of heat required to raise the temperature of a 2kg of aluminium from 24°C to 54°C.
A. 56,000J
B. 252,000J
C. 54,000J
D. 12,600J

15. A yellow object in red light appears
A. Yellow
B. Red
C. Green
D. Black

16. A metal rod is placed close to the cap of appositively charged electroscope, the leaf diverges. Which of the following statements is true a bout the rod?
A. Its positively charged
B. Its negatively charged
C. Its neutral
D. Its an insulator

17. Water waves are produced with a frequency of 4 Hz by hitting the water surface with the tip of a penal. If the waves travel 20m in 10s, what is the wavelength of the waves?

A. $(20 \times 10 \times 4)m$ C. $\left(\frac{20\times4}{10}\right)m$

B. $\left(\frac{10\times4}{20}\right)m$ D. $\left(\frac{20}{10\times4}\right)m$

18. Which of the following shows the radiations that may be emitted by a radioactive substance?

A. α, β and x −rays.
B. Cathode rays, β and x −rays.
C. α, β and γ −rays.
D. α, γ −rays and cathode rays

19. An object is placed 15cm in front of a converging lens and forms an image twice the height of the object. The focal length of the lens is

A. 30cm C. 20cm
B. 10cm D. 15cm

20. Which one of the following statements about sound explains how beats are formed?

A. Interference of two sound waves of slightly different frequencies
B. Diffraction of sound wave through a slit
C. Refraction of sound waves as they travel from one medium to another.
D. Reflection of sound waves of bigger amplitudes.

21. The pressure of a fixed mass of a gas at 17°C is 10^5 Pa. Find its pressure at 29°C if the volume remains constant

A. 1.30×10^5pa C. 1.03×10^6pa
B. 1.67×10^2pa D. 1.59×10^5pa

22.

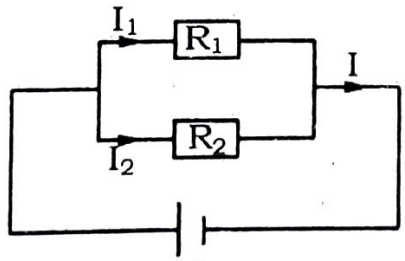


Fig.2

In the circuit shown in figure 2, the effective resistance R is given by

A. $R = R_1 + R_2$ C. $R = \frac{R_1+R_2}{R_1R_2}$

B. $R = \frac{R_1R_2}{R_1+R_2}$ D. $R_1R_2(R_1 + R_2)$.

23. Change distribution on a conductor depends on

A. Nature of the charge
B. Quantity of charge
C. Shape of conductor
D. The material of which the conductor is made

24. A current of 2A flows through a bulb for 105. If the potential difference across the bulb is 6V, find the work done

A. 1.2J
B. 3.3J
C. 30J
D. 120J

25. The mass number of the nucleus of an atom is 7. Which of the following is the number of protons and neutrons

	Electron	Neutron	Proton
A.	3	3	4
B.	4	3	3
C.	3	4	3
D.	3	7	3

26.

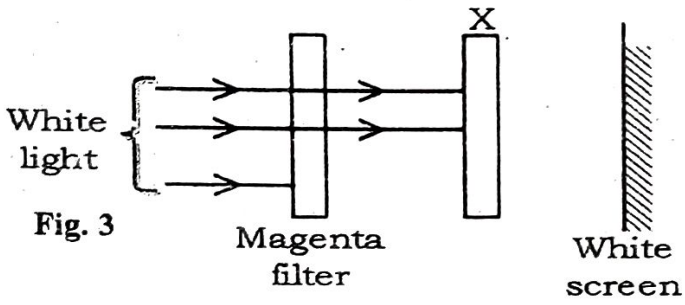


Fig. 3

The diagram in figure 3 shows a white light incident on a magenta colour filter. What colour filter should x be so that red is seen on the screen?

A. Cyan
B. Blue
C. Black
D. Yellow

27. The main function of a step-up transformer is to

A. Change a.c to d.c
B. Change d.c to a.c
C. Increase the current
D. Increase voltage

28. A force of 12N increases the length of an elastic sting by 5cm. Find the force which increases the length by 2cm.

A. 0.83N
B. 6.00N
C. 4.80N
D. 10.00N

29. In a cathode ray oscilloscope, the

A. Horizontal plates deflect the electron beam in the y-direction
B. Electrons are accelerated towards the screen by the grid.
C. Vacuum hinders the motion of the electrons
D. Electrons are emitted from heated anode.

30. Figure 4 shows magnetic field lines between two magnetic poles

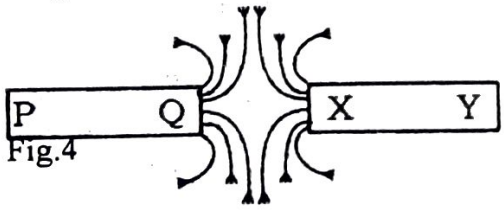


Fig.4

The poles marked **P, Q, X** and **Y** are respectively.

A. S, N, N, and S
B. N, S, S and N
C. S, S, N and S
D. N, N, S and N

31. A change of 1.5C crosses a point in a circuit in 0.5s. Calculate the current in the circuit.
A. 0.3A
B. 7.5A
C. 3.0A
D. 4.5A

32. What fraction of the original mass of a radioactive substance is left after three half-lives?
A. $\frac{1}{16}$
B. $\frac{1}{4}$
C. $\frac{1}{2}$
D. $\frac{1}{8}$

33. Which of the following affects the quality of a musical note?
A. Frequency
B. Resonance
C. Amplitude
D. Reverberation

34. Light can travel from one end of an optical fibre to another, even if the fibre follows a curved path. This is due to
A. Total internal reflection
B. Dispersion of the light
C. Refraction of light
D. The use of plane mirrors

35. An athlete whose weight is 500N runs up a flight of stairs 10m high in 12s. The average power he develops in watts is
A. 73
B. 500
C. 720
D. 5000

36. Which of the following sets of energy changes between kinetic energy and potential energy is correct for a body thrown vertically upwards?

	Kinetic energy	Potential energy
A	Increases	Increases
B	Increases	Decreases
C	Decreases	Increases
D	Decreases	Decreases

37. A ray of light is incident on the water-glass boundary at an angle of 40°. If the refractive indices of water and glass are 1.3 and 1.5 respectively, find the angle of refraction
A. 33.0°
B. 47.8°
C. 56.6°
D. 74.6°

38. A nuclide, $^{234}_{92}X$, decays by emitting on alpha particle and two beta particles to nuclide Y. Which of the following nuclides is correct for Y?

A. $^{228}_{90}Y$ C. $^{230}_{90}Y$

B. $^{228}_{92}Y$ D. $^{230}_{92}Y$

39. An experiment which can be carried out to determine the approximate thickness of molecules of a liquid is called

A. Brownian motion experiment
B. Capillarity experiment
C. Oil-film experiment
D. Diffusion experiment

40. 4 bulbs each rated at 75W operate for 120 hours. If the cost of electricity is sh. 100 per unit, the total cost in shillings will be

A. 7500 C. 900
B. 3600 D. 150

SECTION B (40 MARKS)

Answer all questions in this section. All working must be shown clearly in the spaces provided.

41. (a)(i) What is meant by centre of gravity? (1 mark)

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(ii) State the principle of moments. (1 mark)

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(b) The weights are balanced on a rule of negligible mass as shown in

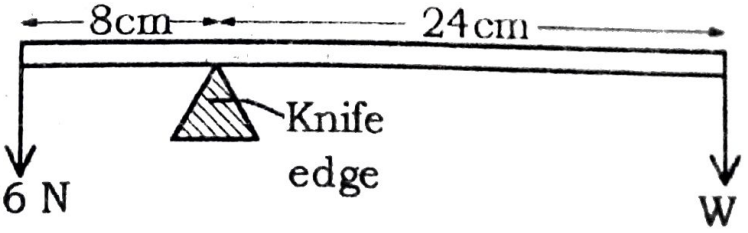

Fig.5

Calculate the value of W. (2 marks)

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42. (a) Define the term dispersion of light (1 mark)

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(b) Yellow light is incident on a glass prism as shown in figure 6

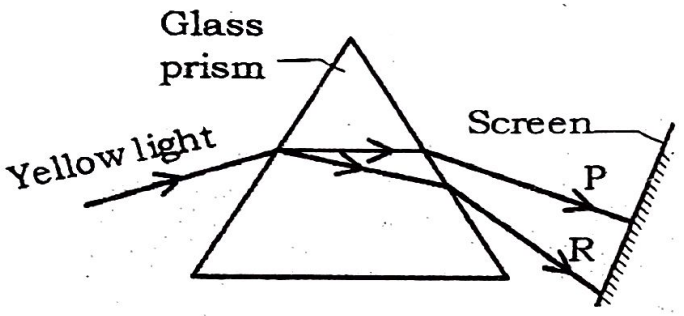

Fig.6

(i) Name the colours **P** and **Q** (½ marks)

P.....

Q.....

(ii) Colour **P** is mixed with cyan. Name the resultant colour. (1 marks)

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(c) State one natural phenomenon which occurs due to dispersion.

(1 mark)

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43. (a) What is meant by the term radioactivity? (1 mark)

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(b) $^{234}_{90}A \xrightarrow{(i)} {}^{234}_{91}B \xrightarrow{(ii)} {}^{234}_{92}C \xrightarrow{(iii)} {}^{230}_{90}D$

The above equation shows three stages (i), (ii), and (iii) of radioactive series.

(i) Name the particles emitted at stage (ii) and stage (iii) (2 marks)

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(ii) Which of the nuclei **A, B, C** and **D** are isotopes? (1 mark)

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44. (a) State Boyle's law (1 mark)

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(b) The volume of a fixed mass of a gas increases from $300cm^3$ to $500cm^3$ at a constant temperature. Find the new pressure of a gas if the initial pressure is 70cmHg. (3 marks)

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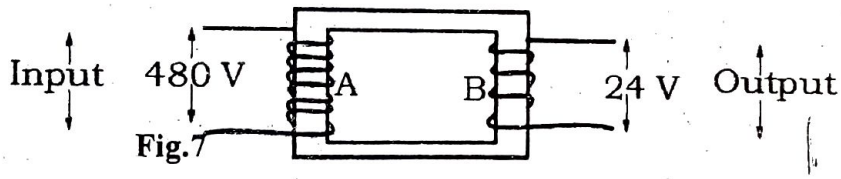

Fig.7

(a) Figure 7 shows a step-down transformer. Name the coils marked

(i) **A**..... (½ mark)

(ii) **B**..... (½ mark)

(b) If the transformer is used to step-down mains supply from 480V to 24V and coil A has 800 turns, determine the number of turns in coil B. (3 marks)

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46. (a) What is meant by

(i) Limit of audibility (1 mark)

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(ii) Ultrasonic sound; as applied to sound waves? (1 mark)

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(b) The distance between two successive antinodes of a standing wave on a string vibrating at 80Hz is 24cm. Find the speed of the waves.

(2 marks)

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47. (a) State

(i) Ohm's law (1 mark)

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(ii) The factors that affect the resistance of a conductor . (1 mark)

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(b) The circuit diagram in figure 8 shows a network by the resistors

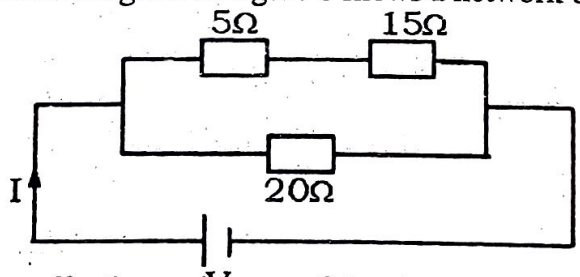

Fig. 8

What is the effective resistance of the circuit? (2 marks)

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48. (a) State two conditions necessary for total internal reflection to occur

(2 marks)

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(b) A ray of light is incident from a denser medium made of Perspex of refractive index 1.49 as shown in figure 9.

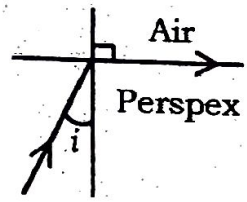

Fig.9

Calculate the value of angle, i, if the refractive index of air is 1.0.

(2 marks)

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49. (a) Distinguish between a conductor and an insulator. (2 marks)

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(b) Describe how a brass sphere can be charged positively by induction.

(2 marks)

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50. Water waves produced as a result of disturbance, are represented as shown in figure 10 where displacement varies with the distance from the source.

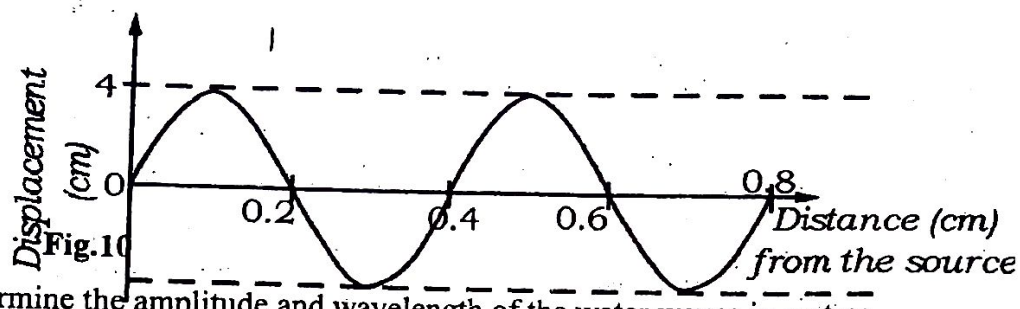

Fig.10

(a) Determine the amplitude and wavelength of the water waves in metres.

(2 marks)

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(b) If the water waves moved at a speed of $320ms^{-1}$, what was the frequency of the source?

(2 marks)

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END