

SC5121  
WASSCE 2024  
PHYSICS 1  
Objective Test  
1¼ hours

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Name .....

Index number .....

Answer all the questions.

Each question is followed by four options lettered A to D. Find the correct option for each question and shade in pencil on your answer sheet, the answer space which bears the same letter as the option you have chosen. Give only one answer to each question. An example is given below.

A body starts moving with a speed of  $40 \text{ m s}^{-1}$  and accelerates uniformly to  $90 \text{ m s}^{-1}$  in 4.0 s. Calculate the distance travelled.

- A. 100 m
- B. 180 m
- C. 200 m
- D. 260 m

The correct answer is 260 m, which is lettered D, and therefore answer space D would be shaded.

ABCD

Think carefully before you shade the answer spaces; erase completely any answer(s) you wish to change.

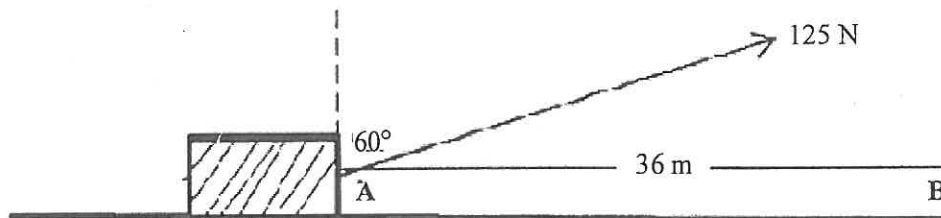
Do all rough work on this question paper.

Now answer the following questions.

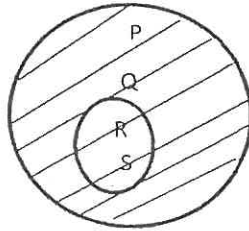
1. The pressure in fluids is generally referred to as
  - A. hydraulic pressure.
  - B. hydrostatic pressure.
  - C. atmospheric pressure.
  - D. manometric pressure.
2. Red, green and blue colors as applied to light are referred to as
  - A. additive colours.
  - B. secondary colours.
  - C. primary colours.
  - D. subtractive colours.
3. Spherical aberration in curved mirrors can be minimized using
  - A. a reflecting telescope.
  - B. a mirror periscope.
  - C. an inclined mirror.
  - D. a parabolic mirror.
4. The rise and fall in the loudness of sound produced when two notes of nearly equal frequencies are sounded together is known as
  - A. doppler effect.
  - B. echo.
  - C. beat.
  - D. harmonics.
5. The average kinetic energy of the molecule of a gas is directly proportional to the
  - A. temperature.
  - B. pressure.
  - C. nature of the gas.
  - D. volume of the gas.
6. A current of 2 A passes through a  $6 \Omega$  for 25 s. The heat generated is used to evaporate 5 g of a liquid at its boiling point. Calculate the specific latent heat of vaporization of the liquid.
  - A.  $360 \text{ J g}^{-1}$
  - B.  $300 \text{ J g}^{-1}$
  - C.  $120 \text{ J g}^{-1}$
  - D.  $60 \text{ J g}^{-1}$

7. Which of the following statements about a closed pipe resonating at its fundamental frequency of 300 Hz is **not correct**?
- If the pressure increases, the fundamental frequency increases.
  - If the temperature increases, the fundamental frequency is constant.
  - The **first** overtone is of frequency 900 Hz.
  - The **second** overtone is of frequency 1,500 Hz.
8. The factor that determines the loudness of a sound wave is the
- pitch.
  - overtone.
  - amplitude.
  - resonance.
9. The half-life of a radioactive element of decay constant  $\lambda$  is given by the expression,
- $\frac{\ln 2}{\lambda}$
  - $\frac{2 \ln 2}{\lambda}$
  - $-\frac{\ln 2}{\lambda}$
  - $-\frac{2 \ln 2}{\lambda}$
10. Which of the following devices does **not** have soft iron?
- An Electromagnet
  - A Magnetic shielding
  - A Compass needle
  - A Transformer
11. A gas of volume  $V_0$  and pressure  $P_0$  is compressed to one-fifth of its volume. If the temperature remains constant, the new pressure will be
- $\frac{P_0}{5}$
  - $\frac{4P_0}{5}$
  - $4P_0$
  - $5P_0$
12. The Physical property of a substance that varies continuously and linearly with changes in temperature and can, therefore, be used to measure temperature is known as
- temperature gradient.
  - thermometric property.
  - linear expansivity.
  - thermometric substance.
13. In a pure inductive a.c circuit, the
- current leads the voltage.
  - voltage leads the current.
  - current is in phase with the voltage.
  - voltage lags behind the current.
14. If the angle between two vectors at a point increase from  $0^\circ$  to  $180^\circ$ , the magnitude of the resultant vector will
- decrease and later increase.
  - increase and later decrease.
  - increase.
  - decrease.

15. A heated gas expands raising a piston. Which of the following statements describes the energy transformation? Energy is transferred
- to the gas by the piston, and to the piston from the heat source.
  - to the gas from the heat source, and to the raised piston from the gas.
  - to the gas in the form of heat and work done by the piston.
  - directly to the piston from the heat source.



16. In the diagram above, a force of 125 N moves a load from point A to B in 2 minutes. Calculate the power expended.
- 34.8 W
  - 31.2 W
  - 18.0 W
  - 3.1 W
17. Two parallel wires are carrying current in opposite directions and are placed a few centimeters apart. Which of the following statements is **correct**?
- There will be attraction between the wires.
  - There will be no movement between the wires.
  - There will be repulsion between the wires.
  - A neutral point will exist between the wires.
18. The **minimum** angle of deviation is  $27^\circ$  when the ray of light passes through a prism of refracting angle of  $47^\circ$ . Calculate the approximate refractive index of the prism.
- 1.4
  - 1.5
  - 1.6
  - 1.7
19. A stone thrown from point *P* follows a parabolic path to the **highest** point *T*. The vertical component of the acceleration of the stone is
- zero at *T*.
  - greatest at *T*.
  - the same at *T* and *P*.
  - greatest at *P*.
20. Inductive reactance is the opposite to the flow of
- a.c through an inductor.
  - d.c through a capacitor.
  - a.c through a capacitor.
  - d.c through a resistor.
21. The velocities of light in air and in glass are  $3.0 \times 10^8 \text{ m s}^{-1}$  and  $2.0 \times 10^8 \text{ m s}^{-1}$  respectively. Calculate the sine of the angle of incidence that will produce an angle refraction of  $30^\circ$ . For a ray of light incident on the glass.
- 1.20
  - 1.00
  - 0.75
  - 0.68

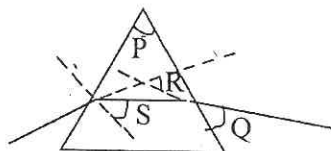


22. The diagram above illustrates the cross section of a flat wood with a hole drilled through it. The center of gravity of the wood is represented by the letter
- P.
  - Q.
  - R.
  - S.
23. The metallic parts of a knife feels colder than its wooden handle at room temperature because
- the molecules of iron vibrate more violently than the molecule of wood.
  - iron has a higher expansivity than wood.
  - the molecules of iron have smaller free mean path.
  - iron is a better conductor of heat than wood.
24. When a block of copper is heated from room temperature to 100 °C,
- it changes state.
  - it expands.
  - its electrical resistance increases.
  - its density increases.
- Which of the statements above is **correct**?
- I and III only
  - II and III only
  - I, II and III only
  - II, III and IV only
25. Which of the following statements is **true** about a vacuum flask?
- The silvered surfaces prevent heat loss by radiation.
  - The vacuum between the two silvered walls prevents heat loss by convection only.
  - The vacuum between the two silvered walls prevents heat loss by conduction only.
  - The cork and cork support prevent heat loss by convection and conduction.
26. Under constant tension, the frequency of the note produced by a plucked string of length 0.90 m is 300 Hz. Determine the length of the string when the frequency is 200 Hz.
- 2.40 m
  - 1.50 m
  - 1.35 m
  - 0.60 m
27. Which of the following appliances uses electromagnets in its operation?
- Moving-iron ammeter
  - Transformer
  - Electric bell
  - Galvanometer
28. When uranium nucleus  $^{236}\text{U}$  emits an alpha-particle, the new nucleus formed has
- an atomic number of 94.
  - a mass number of 239.
  - a proton number of 92.
  - an atomic number of 90.
29. At the equilibrium position of a simple pendulum exhibiting simple harmonic motion, the kinetic energy is
- maximum and the tension zero.
  - zero and the tension is maximum.
  - maximum and the tension is also maximum.
  - minimum and tension zero.

30. The peak value of the alternating voltage across the secondary coil of a transformer is four times as large as the peak voltage of the input signal applied to the primary coil. What is the relationship between the power supplied at the primary coil and the power delivered at the secondary coil?
- Power delivered at the secondary coil is greater than the power supplied at the primary coil.
  - Power delivered at the secondary coil is equal to power supplied at the primary coil.
  - There is no relationship between them.
  - Power delivered at the secondary coil is less than power supplied at the primary.
31. The kinetic energy of a photoelectron ejected from a metal surface illuminated with radiation depends on the
- wavelength of the radiation.
  - intensity of the radiation.
  - source of the radiation.
  - nature of the surface.
- Which of the statements above are correct?
- I only
  - I and IV only
  - II and III only
  - II and IV only
32. When the anode of a diode is connected to the positive and negative terminals of a voltage supply respectively,
- the diode is forward biased.
  - the diode is reverse biased.
  - the diode has a very high resistance.
  - current flows from the cathode to the anode.
33. The angle of deviation of light of various colours passing through a glass prism decreases in the order
- blue, orange, and red.
  - red, blue and orange.
  - orange, blue and red.
  - red, orange and blue.
34. An electric kettle rated 5 A, 210 V is used to heat 2 kg of water from 50 °C to 100 °C. Calculate the time taken. (specific heat capacity of water = 4200 J kg<sup>-1</sup> K<sup>-1</sup>)
- 5.7 minutes
  - 6.7 minutes
  - 7.5 minutes
  - 9.5 minutes
35. An aluminum cup of volume 100 cm<sup>3</sup> is filled with oil at 24 °C and heated to 300 °C. If the co-efficient of volume expansion of oil is 5 × 10<sup>-4</sup> K<sup>-1</sup>, calculate the volume of oil that spilled.
- 0.306 cm<sup>3</sup>
  - 0.745 cm<sup>3</sup>
  - 100.306 cm<sup>3</sup>
  - 102.754 cm<sup>3</sup>
36. The frequency of an a.c. source is doubled. What effect does it have on the capacitive reactance and the root mean square current?
- Both capacitive reactance and r.m.s current are doubled.
  - Both capacitive reactance and r.m.s current are halved.
  - Capacitive reactance is halved and r.m.s current is doubled.
  - Capacitive reactance is doubled and r.m.s current is halved.

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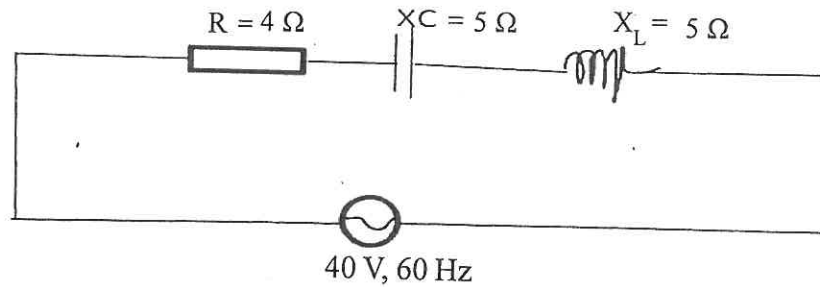
ria



The passage of a ray of monochromatic light through a triangular glass prism placed in air is illustrated in the diagram above. The angle of deviation is marked in

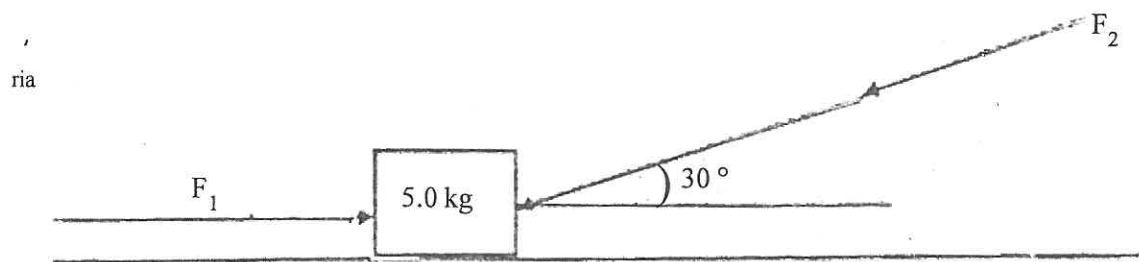
- Q.
- S.
- P.
- R.

38. Which of the following statements about a n-p-n transistor is **true**? The arrow points
- inward on the emitter to indicate direction of electron flow.
  - outward on the emitter to indicate direction of conventional current.
  - inward on the collector to indicate direction of electron flow.
  - outward on the collector to indicate direction of conventional current.
39. A moving coil milliammeter of resistance  $10\ \Omega$  gives a full-scale deflection when a current of  $50\ \text{mA}$  passes through it. The meter can be converted to a voltmeter reading up to  $15\ \text{V}$  by connecting a resistor
- $290\ \Omega$  in series with it.
  - $290\ \Omega$  resistor across it.
  - $300\ \Omega$  resistor in series with it.
  - $300\ \Omega$  resistor across it.

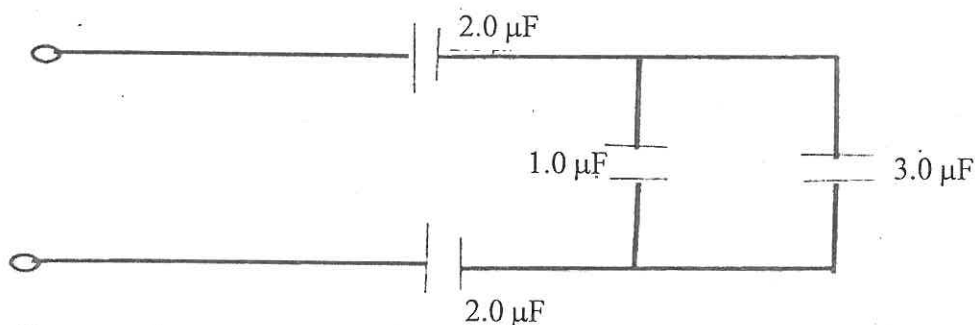


40. The diagram above illustrates an R-L-C circuit at resonance. Determine the value of the current in the circuit.
- $80.0\ \text{A}$
  - $40.0\ \text{A}$
  - $20.0\ \text{A}$
  - $10.0\ \text{A}$
41. Two trains move on parallel-horizonal tracks in opposite directions with different velocities. The magnitude of their relative velocity may be attained by the
- sum of the numerical values of the velocities.
  - difference of the numerical values of their velocities.
  - quotient of the numerical values of their velocities.
  - product of the numerical values of their velocity
42. The distance,  $s$ , travelled by a particle in time,  $t$ , is given by  $s = 30t + 5t^2$ . Determine the instantaneous speed when  $t = 2.0\ \text{s}$ .
- $80\ \text{ms}^{-1}$
  - $50\ \text{ms}^{-1}$
  - $40\ \text{ms}^{-1}$
  - $10\ \text{ms}^{-1}$
43. The **primary** function of an electric motor is to convert
- electrical energy into mechanical energy.
  - mechanical energy into light energy.
  - electrical energy into heat energy.
  - kinetic energy into light energy.
44. In a lens camera, an f-number of 22 means, the
- power of the lens is 22 dioptres.
  - aperture size of the lens is 22 cm.
  - exposure time of the lens is 22 seconds.
  - aperture size of the lens is  $1/22$  of the focal length.

45. Which of the following properties describes the nature of an alpha particle and a beta particle respectively?
- Negative; negative
  - Positive; positive
  - Negative; positive
  - Positive; negative
46. A radioactive material of mass 160 g decays to 10 g in 8 years. Calculate its half-life.
- 1 year
  - 2 years
  - 3 years
  - 4 years
47. The unit of Plank's constant is
- Joule – second.
  - Joule – metre.
  - Joule per second.
  - Joule – hertz.
48. Which of the following statements about a d. c. motor is **correct**?
- Electrical energy is converted into mechanical energy.
  - Mechanical energy is converted into electrical energy.
  - Direction of motion is determined by Flemings' right-hand rule.
  - The motor has slip – rings.



49. Two forces,  $F_1$  and  $F_2$  act on an object as illustrated in the diagram above. If the object accelerates to the left at the rate of  $0.8 \text{ m s}^{-2}$ , calculate the magnitude of  $F_1$ .
- 4 N
  - 16 N
  - 30.64 N
  - 38.64 N



50. Four capacitors are connected as illustrated above. Determine their equivalent capacitance.
- $8.0 \mu\text{F}$
  - $4.5 \mu\text{F}$
  - $0.8 \mu\text{F}$
  - $0.5 \mu\text{F}$

**END OF PAPER**