REPUBLIQUE DU CAMEROUN
PAIX – TRAVAIL – PATRIE
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MINISTERE DES ENSEIGNEMENTS SECONDAIRES
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REGION DE CENTRE

REPUBLICOF CAMEROON
PEACE – WORK – FATHERLAND
…………………..

MINISTRY OF SECONDARY EDUCATION
…………………...
CENTRE REGION

CASPA-INTER-REGIONAL MOCK EXAMINATION-CASPA-IRMEX BOARD	SUBJECT CODE NUMBER 780	PAPER NUMBER 1
CANDIDATE NAME: …………………………………… CANDIDATE NUMBER: ………………………………… CENTRE NUMBER: ……………………………………	SUBJECT TITLE PHYSICS	
ADVANCED LEVEL	**DATE: March 2024**	

Time Allowed: One and a half hours

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper.

Make sure you have a soft HB pencil and eraser for this examination.

1. Use a soft HB pencil throughout the examination
2. Do not open the booklet until you are told to do so.

Before the examination

3. Check that this questions paper is headed 'Advanced Level Information and Communication technology 796'
4. Insert the information required in the space provided.
5. Without opening the booklet, pull out your answer sheet carefully form inside the front cover of this booklet. Take care that you do not erase or fold the answer sheet or make any mark on it other than those asked for in this instructions.
6. Insert the information required in the space provided on the answer sheet using your HB pencil.

Candidate Name, Centre Number and Name, Candidate Number, Subject Code Number and Paper Number.

7. Answer all the 50 questions in the examination. All question carry equal marks.
8. Non-programmable calculators are allowed.
9. Each question has FOUR suggested answers: A, B, C and D . Decide on which answer is correct. Find the number of the question on the sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen. For example if B is your correct answer, mark as shown below:

   [A] ~~[B]~~ [C] [D]

10. Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase that mark carefully, then mark your new answer.
11. Avoid spending too much time on any one question. You can come to these questions later.
12. Do all rough work in this booklet, using where necessary, and the blank spaces in the question booklet.
13. Mobile phones are not allowed in the examination room.
14. You must not take this booklet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.

You may find the following constants useful

- **acceleration of free fall, g = 10 m s^{-2}**
- **the speed of light in vacuum c = 3 x 10^8 m s^{-1}**
- **the charge on an electron e = 1.6 x 10^{-19} C**

Questions: 1- 35

Directions: Each of the thirty-five questions or incomplete statements in this section is followed by four suggested answers. Select the best answer in each case.

1. A step-down transformer with a turn ratio of 5:4 and an efficiency of 88% is used to run a motor. If the mains a.c. is 5.0 A, the current drawn by the motor will be:
   A. 3.5   B. 8.8   C. 1.8   D. 5.5

2. Intensity defined as power per unit area. Which of the following is the base units of intensity?
   A. $Kg\ m^2\ s^{-1}$ C. $Kg\ s^{-3}$
   B. $Kg\ m^4\ s^{-3}$ D. $Kg^2\ m^2\ s$

3. An arrow is shot straight up in the air at an initial speed of 15.0 m/s. After how much time is the arrow moving downward at a speed of 8.00 m/s?
   A. 0.71 s   C. 1.24 s
   B. 1.87 s   D. 2.35

4. In *figure 1*, a bullet is fired from the top of a tower at an angle of 60° to the horizontal.

Figure 1
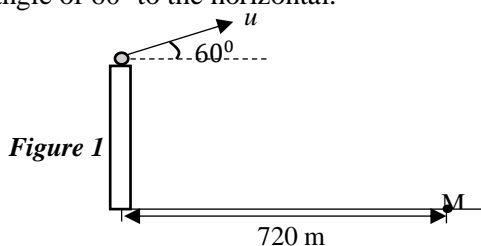
720 m

   If the bullet takes 12 s to land on the ground at M which is 720 m from the bottom of the tower. The projection speed, *u*, of the projectile is:
   A. $69\ m\ s^{-1}$ C. $110\ m\ s^{-1}$
   B. $90\ m\ s^{-1}$ D. $120\ m\ s^{-1}$

5. Which of the following phenomena provides evidence that light has a wave nature?
   A. Emission of light from energy level transitions in atoms.
   B. Diffraction of light passing through a narrow opening.
   C. Absorption of light by a black sheet of paper
   D. Photoelectric effect.

6. A lamp is placed 0.50 m from a converging lens. The power of the lens is 5.0 D. What is the distance from the lens to the focused image?
   A. 0.14 m   C. 0.33 m
   B. 0.20 m   D. 0.45 m

7. If plane polarized light is sent through two polarizers, the first at 45° to the original plane of polarization and the second at 90° to the original plane of polarization, what fraction of the original polarized intensity passes through the last polarizer?
   A. $\frac{1}{10}$ B. $\frac{1}{4}$ C. $\frac{1}{2}$ D. $\frac{1}{8}$

8. A diffracting grating with 600 lines per millimeter is illuminated normally by a monochromatic light of wavelength 600 nm. The number of fringes seen excluding the central fringe is:
   A. 5   B. 2   C. 3   D. 4

9. A pipe closed at one end and containing air, is made to oscillate such that its third overtone is 2800 Hz. Which of the following is its fundamental frequency?
   A. 933 Hz   C. 700 Hz
   B. 400 Hz   D. 560 Hz

10. In an experiment to determine the heat capacity of a metal heat was supplied at a steady rate of 1000 Js^{-1}. *Figure 2* shows the variation of temperature with time.
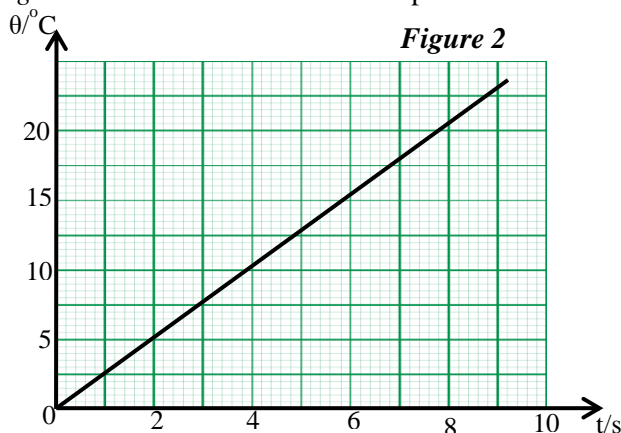
    If the mass of the metal is 7.5 kg, then the value for the specific heat capacity of the metal would be;
   A. 333.3   C. 3000
    B. 53.3   D. 1875

11. A capacitor of capacitance 120 μF is charged by a 9.0 V battery through a resistor of 80 kΩ. The time taken for the capacitor to acquire 75 % of its final charge in seconds is:
    A. 9.9   B. 6.7   C. 13.3   D. 13.8

12. Two identical and similarly charged tennis balls, X and Y, each of mass   1.5 g are suspended from a support as shown in *figure 3*.

Figure 3
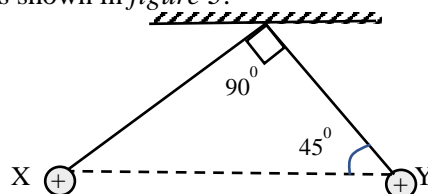
    The electrostatic force between the two balls is
    A. 1.47×10^{-2} N   C. 1.92×10^{-2} N   B. 2.29×10^{-2} N   D. 3.01×10^{-2} N

13. An object of mass *m* is located on the surface of a spherical planet of mass *M*, radius *R* and surface field strength, *g*. If G is the gravitational constant, then the escape speed from the planet depends one of the following?
    A. *M*   B. *G*   C. *m*   D. *R*

14. In the year 2013, a laboratory held a stock of 4.0 mg of a radioactive isotope which has a half-life of 2.0 years. The stock was originally purchase in the year 2005. The quantity of the isotope that was bought in the first place in mg is:
    A. 0.32   B. 64.0   C. 16.0   D. 0.25

15. Why is a stress-strain characteristic preferred to a force extension graph in describing the mechanical behaviour of a material?


A. A thin long wire gives a measurable extension for a small force.
B. A stress-stain curve gives more detail amount the behaviour of the material.
C. With a stress-stain graph, the wire would not undergo plastic deformation.
D. It is easier to plot a stress-strain curve than a force-extension graph.

16. When washing tomatoes in water of density 1000 kg/m^3, it is found that a particular fruit float such that only 15 % of its volume is above the water. The density of the fruit in kg/m^3 is:
A. 750   B. 650   C. 850   D.150

17. Which of the following is the reason why a balance point may **NOT** be found in a potentiometer experiment?
A. The positive terminal of the test cell is connected to the positive terminal of the driver cell
B. The potential difference of the driver cell is greater than the potential difference across the potentiometer wire.
C. The potential difference to be measured is greater than the potential difference across the potentiometer wire.
D. The potentiometer wire is not uniform and long enough

18. In the circuit shown in *figure 4*, the voltmeter reads 2.4 V when the switch is opened and 2.1 V when the switch is closed. Given that the internal resistance of the d.c. source is 2.0 Ω.

Figure 4
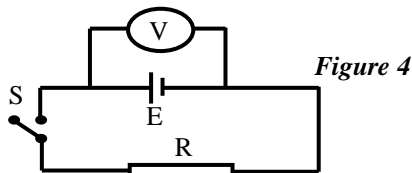
The value of the resistance R in Ω is:
A. 0.286   B. 16.0   C. 14.0   D. 4.29

19. Oxygen gas having a density of 3 kg m^{-3} exerts a pressure of 3 x 10^6 Pa. What is the root mean square velocity of the gas?
A. 1000 ms-1   C. 535 m s^{-1}
B. 1732 m s^{-1} D. 1500 m s^{-1}

20. Which of the following sets of conditions is necessary to achieve an approximate adiabatic change?
A. Thick-walled, highly insulating vessel, slow change.
B. Thin-walled, highly insulating vessel, slow change.
C. Thin-walled, highly insulating vessel, slow change.
D. Thick-walled, highly insulating vessel, rapid change.

21. The amount of energy needed to convert 1.2 kg of pure water at 60 ^{o}C to steam under standard atmospheric pressure in joules is:

A. 201600   C. 2712000
B. 2913600   D. 2510400

22. Using a steady force of 150 N, a farmer succeeds in pulling horizontally a 20 kg bag of potatoes through 20 m along a flat horizontal pavement. As she does so, she overcomes frictional force of 50 N. How much work is done on the bag?
A. 1000 J   B. 2000 J
B. 3000 J   D. 4000 J

23. An object of mass 0.4 kg, hanging from a spring with a spring constant of 8.0 N m^{-1}, is set into an up-and-down simple harmonic motion. What is the magnitude of the acceleration of the object when it is at its maximum displacement of 0.10 m?
A. 2.4 m s^{-2} C. 0.45 m s^{-2}
B. 1.0 m s^{-2} D. 2.0 m s^{-2}

24. *Figure 5* shows a uniform plank of length 3.00 m supported at two pivots X and Y.


Figure 5
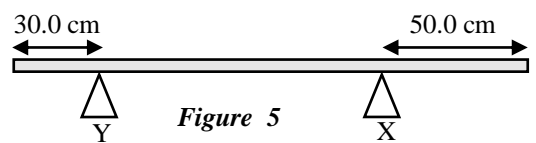
If the plank has a weight of 44.0 N, then the reaction at X is
A. 40.5 N   C. 24.0 N
B. 16.2 N   D. 20.0 N

25. The set of three quantities in the following sets that are all vectors is
A. Energy, Power, Weight
B. Torque, Impulse, Field strength
C. Moment, Power, Weight
D. Force, Impulse, Pressure.

26. *Figure 6* shows a network of three capacitors.
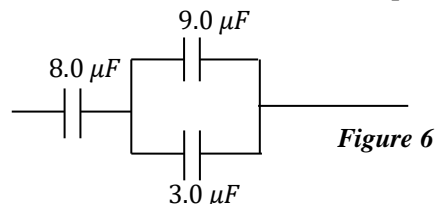
Figure 6

The resultant capacitance of the network, in μF, is
A. 4.8   B. 10   C. 20   D. 9.6

27. If a current of 5.0 A is passing through a coil of inductance 100 mH and resistance 0.1 Ω, the ratio of the energy dissipated in 10 s to the energy stored is?
A. 1:0.2   B. 1:2.5   C. 1:0.5   D. 1:1

28. *Figure 7* shows a straight conductor AB being moved through a uniform magnetic field directed into the paper.

Motion
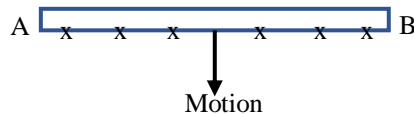
Which of the following statements is correct?
A. The induced conventional current in the conductor flows from B to A.
B. The induced e.m.f. in the conductor gives B at a higher potential than A.

C. The conventional induced current in the conductor flows from A to B.

D. The induced electric field in the conductor is directed from B to A.

29. An a.c. signal of frequency 200 Hz is applied to the Y plates of a cathode ray oscilloscope (CRO) whose time base is set at $1\ ms\ cm^{-1}$. The number of cycles on the 25 cm wide screen of the CRO is:

   A. 4   B. 5   C. 6   D. 7

30. The least distance between two points on a progressive wave having a phase difference of π radians is 6.0 cm. the waveform of the wave reveals that the duration of 50 cycles is 2.5 ms. The speed of the wave in ms^{-1} is:

    A. 1.2×10^3 B. 2.4×10^2

    B. 6.0×10^{-6} D. 2.4×10^3

31. The maximum kinetic in eV of an electron ejected from a sodium surface of work function 2.28 eV when illuminated by light of wavelength 400 nm is:

    A. 3.03 eV   B. 0.71 eV
    B. 0.81 eV   C. 3.09 eV

32. A particle of charge q and mass m is accelerated from rest through a p.d. V. if the Plank's constant is h, the De Broglie wavelength is:

    A. $\dfrac{h}{\sqrt{2qmV}}$ C. $\dfrac{h}{mV}$

    B. $\dfrac{2h}{qmV}$ D. $\dfrac{h^2}{2qmV}$

33. A silver wire has a resistance of 2.1 ohms at 27.5 °C and a resistance of 2.7 ohms at 100 °C. The temperature coefficient of the silver wire is:

    A 0.02 °C^{-1} C 0.004 °C^{-1}
    B 0.05 °C^{-1} D 0.009 °C^{-1}

34. *Figure 8* shows a potentiometer the test cell of emf 1.5 V is balanced at the point C.

Figure 8
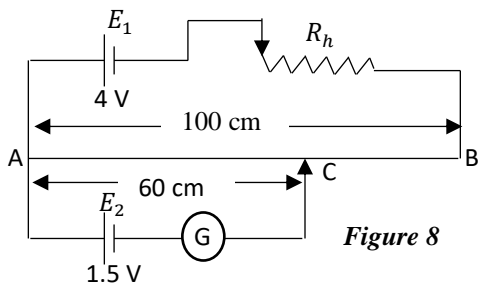
What is the p.d between the ends A and B of the potentiometer?

    A. 1.5 V   B 3.75 V   C 2.5 V   D 4 V

35. Two balls M and N are projected horizontally off the edge of a table. The velocity with which M is projected is twice that of N. which of the following is true about M and N?

    A. M and N touch the ground at the same time.
    B. M touches the ground first.
    C. N travels further from the base of the table than M.
   D. N touches the ground first.

SECTION II (Ten questions) Multiple Selection
Questions 36- 45

Directions: for each group of questions below, ONE or TWO of the responses given is /are correct. Then choose

A	If 1 and 2 are correct
B	If 2 and 3 are correct
C	If 1 only is correct
D	If 3 only is correct

Directions summarised			
A	B	C	D
1,2 only	2,3 only	1 only	3 only

36. An object is released fronl an aeroplane travelling horizontally at a height of 200 m above the ground. Which of the following statements is/are correct?
    1 The initial velocity of the object relative to the plane is zero
    2 The minimum time taken before the object hits the ground is 6.4 s
    3 The horizontal velocity of the object increases with time

37. If a metal wire of cross-sectional area A, has n free electrons per unit volume each having a charge e and moving with a drift velocity v, then:
    1 The total charge in the wire is *ne*
    2 The current per unit area is *nev*
    3 The rate of flow of charge is *nevA*

38. Identify the correct comparison between electrical and thermal conduction by a well-insulated conductor
    1 The pd across the ends of the conductor is analogous to the temperature difference between the ends of the conductor.
    2 The electrical current is analogous to the rate of flow of heat.
    3 The electrical resistance is analogous to the reciprocal of thermal conductivity.

39. *Figure 9* below shows how the net force F between a pair of molecules varies with their separation r.
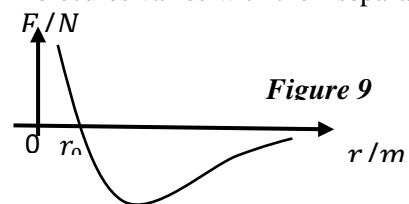
Figure 9

From the figure, it is true that:
    1 When $r = r_0$, the molecules are at rest.
    2 When potential energy of the molecules has its minimum value at r_0.
    3 When $r < r_0$ the net force is repulsive.

40. When two bodies A and B are in thermal equilibrium with each other, it implies that:
    1 No energy flows from one object to the other.
    2 A and B are at the same temperature.
    3 Exchange of heat between A and B is balanced.

41. In an RCL circuit, the current in the circuit

$$I = \frac{V}{\sqrt{(X_L - X_C)^2 + R^2}}$$

1. The quantity $\sqrt{((X_L - X_C)^2) + R^2}$ is called the impedance of the system and has the units of ohm.
2. A maximum current will flow in the circuit if $X_L = X_C$.
3. The resistance R at the resonance point is always zero.

42. Which of the following slatements is/are true for a sinusoidal signal of peak voltage V_0 and peak current I_0 flowing through a capacitor?
1. Average power dissipated through a resistive load is constant.
2. Current always leads voltage by $\pi/2$
3. The average power dissipated in a resistive load is $P_{av} = \frac{V_0 I_0}{\sqrt{2}}$

43. For a point charge:
1. The field intensity decreases with distance according to the inverse square law.
2. The field is uniform.
3. The field has different strengths at equal distances from the charge.

44. A metal spring is stretched until it undergoes plastic deformation. Which of the following statements is/are correct?
1. The spring is stretched within its limit of elasticity.
2. When the deforming force is removed, the spring will not regain its original length.
3. The spring is stretched beyond its limit of elasticity.

45. Which pair(s) of the following statements is/are true about progressive and stationay waves.

	For progressive waves	For stationary waves
1	There is no net transfer of energy	There is net transfer of energy
2	Amplitude is constant	Adjacent points have different Amplitudes
3	There is gradual phase variation	Points between adjacent nodes are in phase

Section III (five questions)
Questions 46-50
Directions: Each of the questions (46-50) has four sets of graphs A-D. Which of the graphs in each question best fits the relationship between x and y
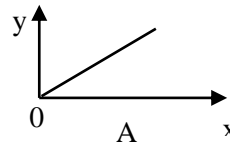
46.

y	x
Average kinetic energy of molecules of a substance undergoing change of state	Temperature of substance
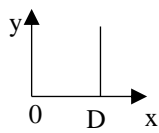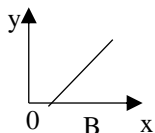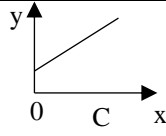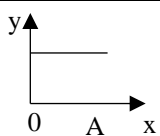
47.

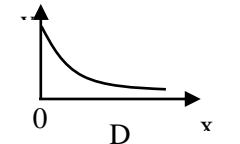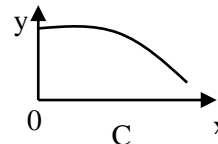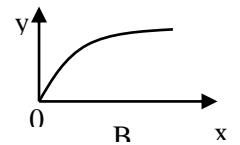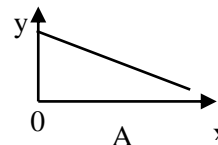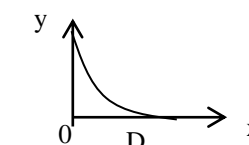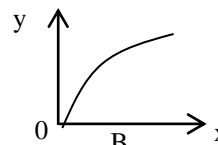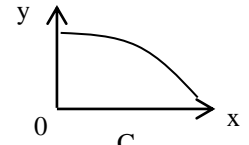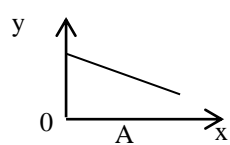| y	x
Mean square speed of gas molecules	Absolute temperature of the gas
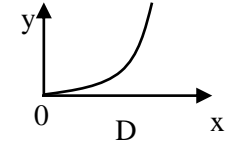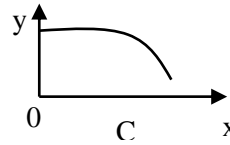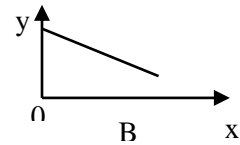
48.

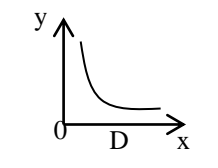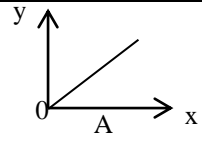| y	x
Resistance of a thermistor with a negative temperature coefficient of resistance	Temperature

49.

y	x
Current in an inductive coil when switched off	Time

50.

y	x
Total energy for a body in SHM	Time
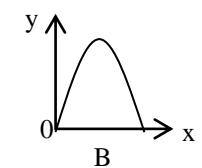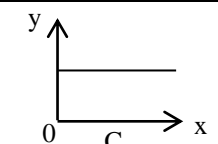
STOP!
GO BACK AND CHECK YOUR WORK