CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

0780 PHYSICS I

JUNE 2019   **ADVANCED LEVEL**

Centre Number	
Centre Name	
Candidate Identification Number	
Candidate Name	

Mobile phones are NOT allowed in the examination room.

MULTIPLE CHOICE QUESTION PAPER

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 an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the examination begins:

3. Check that this question booklet is headed "Advanced Level – 0780 PHYSICS1"
4. Fill in the information required in the spaces above.
5. Fill in the information required in the spaces provided on the answer sheet using your HB pencil: **Candidate Name, Exam Session, Subject Code and Candidate Identification Number.** Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instruction.

How to answer the questions in this examination

6. Answer ALL the 50 questions in this Examination. All questions carry equal marks.
7. Calculators and Formulae booklets are allowed.
8. Each question has FOUR suggested answers: A, B, C and D. Decide which answer is appropriate. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.

    For example, if C is your correct answer, mark C as shown below:

    [A] [B] [C̶] [D]

9. 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 the first mark carefully, then mark your new answer.
10. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.
11. Do all rough work in this booklet using the blank spaces in the question booklet.
12. **At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Turn Over

03/0780/1/B/MCQ
© 2019 CGCEB

2

Section I
(Thirty five questions)
Questions: 1- 35

Direction: 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. Which of the following statements best explains why the homogeneity of a physical equation is not a sufficient condition for the correctness of the equation?
   For an equation to be homogenous the
   A   units of the physical quantities on both sides of the equation must be equal.
   B   All correct equations are homogenous but not all homogenous equations are correct.
   C   A homogenous equation may contain a wrong unit less constant.
   D   Homogeneity can be used to test the relationship between quantities in a physical equation.

2. Which of the following sets x, y, and z contains two vector quantities and one scalar quantity

	X	Y	Z
A	Power	velocity	E-Field
B	Force	Energy	Pressure
C	Weight	Momentum	Displacement
D	Mass	Torque	Temperature

3. A small mass m is suspended from one end of a vertical string and then whirled in a horizontal circle at a constant velocity v
   A   The centripetal force acting on m is $T\cos\theta$
   B   The only force on m is its weight.
   C   The weight of the mas is given by $T\sin\theta$
   D   The string become inclined to the vertical at an angle θ where $\tan\theta = v^2/rg$

4. An iron ball X and a copper ball Y of the same volume are thrown horizontally with the same velocity 'u' from the top of a tall building. Which of the following statements is true if air resistance is ignored?
   A   X reaches the ground before y at the same distance from the building
   B   X reaches the ground at the same time with y but at a smaller distance from the building.
   C   X reaches the ground at the same time with y but as a greater distance from the building.
   D   X and y reach the ground at the same time and at the same distance from the building.

5. A snooker ball x collides head-on with another snooker ball y moving in the opposite direction. Which of the following statement below is the correct statement of the conservation of momentum?
   A   The total momentum in the x and y directions stay constant.
   B   The initial and final momenta of x is the same.
   C   The sum of the x and y components of the momentum is zero.
   D   The final momentum of x is the same as the final momentum of y.

6. A battery is connected to a parallel-plate capacitor that stores 6.0×10^{-4} J of energy. If the separation between the plates of the capacitor is doubled. Which of the following would be the value of the energy stored?
   A 1.5×10^{-4} J
   B 1.2×10^{-4} J
   C 3.0×10^{-4} J
   D 6.0×10^{-4} J
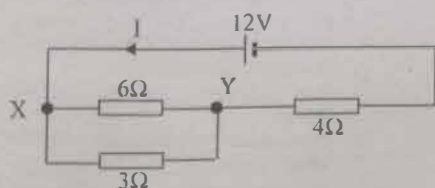
2016/0780/1/A/MCQ

3

7.

Figure 1

Figure 1 shows a battery of 12V connected to three resistor. Which of the following sets of values is the correct value of the p.d across XY and main current in the circuit?

	p.d across xy	Main current
A	8 V	4 A
B	4V	2 A
C	4 V	8 A
D	6 V	1 A

8. A cell has an emf of 2.5 V. It cannot be balanced on a potentiometer of length 100.0 cm when connected to a driver cell of 2.0V. Which of the following best explains why there is no balance point?
    A   The current in the wire is too low.
    B   The balance length is too small.
    C   The emf of the cell is too low.
    D   The voltage across the wire is too low.

9. An electrically charged pith ball of mass 4.0×10^{-4} kg is suspended by a light thread of negligible mass and placed in a uniform electric field of strength 4.0×10^2 N/C. if the ball is deflected through an angle of 10^0 then the magnitude of the charge on it is;

    A   2.0 C
    B 2.0×10^{-6}C
    C 2.0×10^{-4}C
    D 2.0×10^6C

10. The resonant frequency in an L –C circuit is 40MHz. When the inductance is increased by a factor of four keeping the capacitance constant. Which of the following is the correct value for the new resonant frequency in MHz
    A   10
    B   20
    C   5
    D   40

11. Which other essential information is required to calculate the energy needed to change 0.5 kg of ice at -10^0C to water at 20 ^{0}C if energy lost to the surroundings and calorimeter is negligible.
    A   Mass of water, Specific latent heat of fusion of ice and Specific heat capacity of water
    B   mass of calorimeter, Specific heat capacity of water and Specific latent heat of fusion of ice
    C   Specific heat capacity of ice, Specific latent heat of fusion of ice, Specific heat capacity of water
    D   Specific heat capacity of ice, Temperature rise, Specific latent heat of fusion of ice and Time taken

12. The simple kinetic theory of gases may be used to drive the expression relating the pressure P to the density ρ of a gas.

$$p = \frac{1}{3}\rho\overline{c^2}$$

In this expression, what does, $\overline{c^2}$, represents?

    A   The square of the most probable speed of the gas molecule
    B   The square of the average speed of the gas molecules
    C   The root-mean square speed of the gas molecules
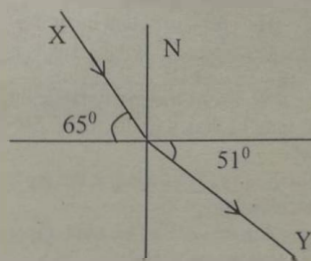   D   The average of the squares of the speeds of the gas molecules

13.

Fig N'

Figure 2 shows a ray of light x in glass refracted into air. If the speed of light in air is 3.0×10^8 ms⁻¹. Which of the following is the correct value for the speed of light in glass?
    A 2.0×10^8 ms⁻¹
    B 3.0×10^8 ms⁻¹
    C 1.8×10^8 ms⁻¹
    D   340 ms⁻¹

2019/0780/1/B/MCQ

Go on to the next page

4

14. Tungsten obeys Ohm's law because
   A the current decreases with increase in temperature.
   B the current in it is proportional to the number of charge carriers.
   C the current through it is proportional to the p.d. across it at constant temperature.
   D the resistance is proportional to temperature.

15. A diffraction grating of 500 lines per millimeter is illuminated normally by light of wavelength 600nm. Which of the following images can be seen on either side of the normal excluding the central image?
   A 3
   B 4
   C 6
   D 2

16.
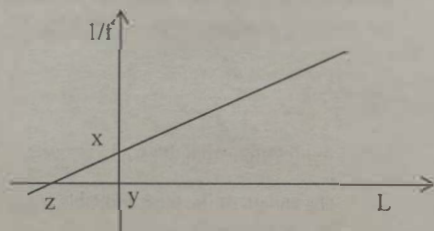
Figure 3

Figure 3 shows the variation of 1/f against L, where f is the frequency of a tuning fork and L is the length of the vibrating air column. The end correction is .c, and the velocity of sound in air is v.
   A The slope of the graph is 4c/v
   B XY is the end correction.
   C The speed of sound in air is 4/ slope
   D The intercept of the graph is c/v

17. The first law of thermodynamics for an ideal gas may be stated in the form $\Delta U = \Delta Q + \Delta W$
Which of the following is the most correct statement about the equation?
   A $\Delta Q = -\Delta W$ when the temperature increases slightly.
   B $\Delta U = 0$ when no heat enters or leaves the system.
   C ΔW is the work done by the gas
   D $\Delta U = 0$ when the heat is supplied at constant temperature

18. Two bodies P and Q are in thermal equilibrium. This statement means that
   A There is no transfer of energy between P and Q.
   B The rate of transfer of heat between P and Q is constant.
   C P and Q have the same amount of internal energy.
   D P and Q are in physical contact with each other.

19. An electron moves in a circular orbit in a uniform B-field. Which of the following statements is the most correct?
   A The period of the electron in the orbit is independent of the speed of the electron.
   B The force on the electron is parallel to the field
   C The speed of the electron is independent of the radius of the orbit.
   D The B-field is proportional to the radius of the circle.

20. Figure 4 shows how the force exerted normally on a vertical wall by a fast moving tennis ball varies with time.
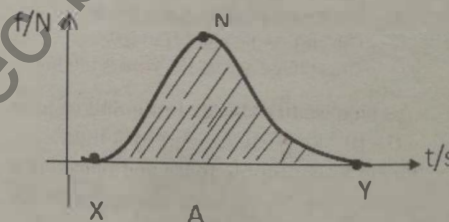

Figure 4

Which of the following statement is correct about the interaction?
   A The area under the graph gives the change in momentum experienced by the ball.
   B The contact of the ball with the wall begins at Y and ends at X.
   C The maximum pressure on the ball is X.
   D The minimum impulse on the ball is at N.

21. The work function of caesium is 1.4 eV. The maximum velocity of electrons emitted from the surface of caesium when illuminated by ultra violet light of wavelength 380nm is;

   A 8.1×10^5 m s^{-1}
   B 6.0×10^5 m s^{-1}
   C 8.0×10^3 m s^{-1}
   D 0.8×10^4 m s^{-1}

22. Which of the following statements best explains the fact that electromagnetic radiation and electrons can both exhibit wave-like characteristics?

   A   Electrons have light mass and move in a circular path in a B-field.
   B   Electrons and X-rays are both diffracted by crystals.
   C   Electrons and radio waves can be both reflected and refracted by crystals.
   D   Gamma and x-rays can be refracted and diffracted by crystals.

23. When boron -11 $\left({}^{11}_{5}B\right)$ is bombarded with alpha particles a new nucleus is formed and a neutron is released. Which of the nuclear equations below represents the reaction?

   A ${}^{11}_{5}B + {}^{4}_{2}He = {}^{14}_{7}N + {}^{1}_{0}n$
   B ${}^{11}_{5}B + {}^{4}_{2}He = {}^{14}_{76}C + {}^{1}_{0}n$
   C ${}^{11}_{5}B + {}^{2}_{1}H = {}^{12}_{6}N + {}^{1}_{0}n$
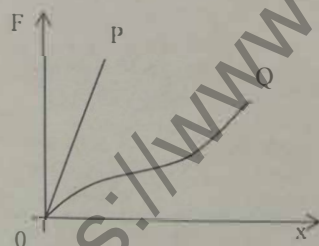   D ${}^{11}_{5}B + {}^{3}_{2}He = {}^{13}_{7}N + {}^{1}_{0}n$

24.

Figure 5

Figure 5 shows how the applied force, F, varies with the extension, x, for two different materials P and Q. Which of the following combinations best identifies the materials P and Q?

	P	Q
A	Rubber	Copper
B	Rubber	Glass
C	Glass	Rubber
D	Iron	Glass

25. When light falls on a clean glass block of refractive index 1.5, it is noticed using a Polaroid that the refracted ray is completely plane polarized. Which of the following values is the angle of reflection

   A   56°
   B   45°
   C   90°
   D   44°

26. Figure 6 shows a metal rule of mass 200 g supported by a pivot at the 20 cm mark and a string at the 100 cm mark. The sting passes round a frictionless pulley and carries a mass of 80 g.
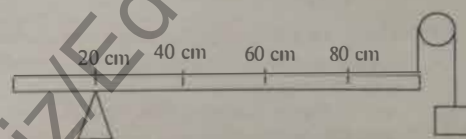

Figure 6

At which mark on the rule must a 20 g mass be suspended so that the rule balances?

   A   20 cm mark
   B   40 cm mark
   C   50 cm mark
   D   60 cm mark

27. Which of the following quantities has the smallest numerical values in SI units?

   A   The charge on an electron.
   B   The mass of an electron.
   C   The mass of an alpha particle.
   D   The mass of a hydrogen atom.

28. The electrons in a cathode ray tube are accelerated from the cathode to the anode by a potential difference, V. This p.d is increased by a factor of 4, which of the following statements is true when the electrons arrive the screen?

   A   It will have four times the kinetic energy and four times its velocity.
   B   It will have four times the kinetic energy and two times the velocity
   C   It will have twice the kinetic energy and velocity
   D   It will have the same momentum in both cases.

29. Which of the following descriptions is consistent with a constant decrease in the current through a uniform piece of a conductor?

	No of electrons per unit volume	Drift velocity of electrons
A	Unaltered	Increases
B	Decreases	unaltered
C	Unaltered	Decreases
D	Increases	Decreases

30. A converging lens of focal length 12.0 cm forms an upright image four times the size of its real image. Which of the following is the distance of the object?
    A 15 cm
    B 30 cm
    C 12 cm
    D 24 cm

31. Which of the following statements best explains why an ammeter is always connected in series in an electrical circuit?
    A It allows current to flow through it.
    B The ammeter is a very accurate current measuring instrument.
    C The pd across the ammeter is usually negligible.
    D The ammeter is extremely sensitive to changes in temperature.

32. In a number of successive decay processes in a nucleus there is a net decrease in the proton number by one and a net decrease in the nucleon number by four. Which of the following particles could be emitted?
    A An alpha and a beta particle.
    B 1 alpha and 2 Beta particles
    C 1 alpha and 3 beta particles
    D 2 alpha and a beta particle.

33. In an experiment to determine the heat capacity of a metal heat was supplied at a steady rate of 1000 Js⁻¹
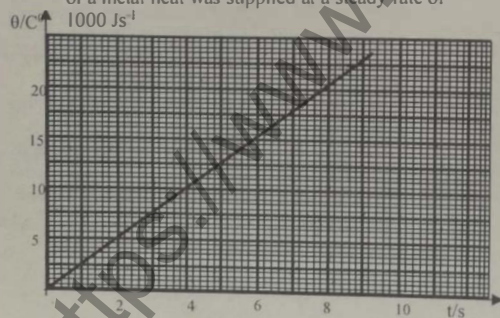

Figure 7

Figure 7 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
    B 53.3
    C 3000
    D 1875

34. A moving-coil galvanometer of internal resistance 20 Ω gives a full-scale deflection for a current of 10.0×10^{-3} A. If an external resistor of resistance 0.025 Ω is connected in parallel to it, this instrument can be used as a voltmeter or ammeter of range.
    A $0-0.2 \times 10^{-3}$ A
    B 0- 8 V
    C 0-8.0A
    D $0-2.5 \times 10^{-2}$ V

35. An observer is moving towards a sound source of constant frequency with a velocity of 40 ms⁻¹. He observes the frequency to be 560 Hz. If the velocity at which the observer is moving towards the sound source doubles, what will be the new observed frequency?(speed of sound in air is 330 m s⁻¹)
    A 620 Hz
    B 500 Hz
    C 660 Hz
    D 380 Hz

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.
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.
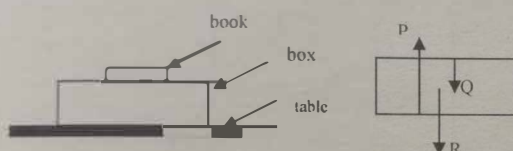
Figure 8

Figure 8 shows a book lying on a box which rests on a table. A free-body force diagram for the box is also shown. Which of the following statements is/are correct?

1 Q is the pull of the earth on the box
2 P is the push on the box by the ground.
3 R is the pull of the earth on the box.

37. A parallel plate capacitor is connected is series with a battery. Which of the following procedures would result in doubling the capacitance of the capacitor?

1	Increasing area by 4	Half the distance
2	Keep area constant	Increase distance by 4
3	Half area	Increase distance by 4

38. The entropy of a thermodynamic system in equilibrium is
1 zero
2 Always increasing
3 Always decreasing

39. Which of the following deductions is/are true for Newton's first law of motion?
1 A body is in uniform motion only when no force acts on it.
2 A resultant force is necessary to cause an object to accelerate
3 The motion of a body in the absent of a net force is rectilinear.

40. Figure 9 shows two infinitely long conductors X and Y of negligible cross-sectional area placed 1.0 m apart in a vacuum.
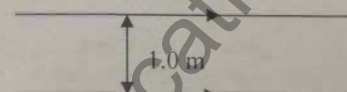

Figure 9

If the force per unit length between the conductors is 8.0×10^{-7} N m^{-1}, then it can be concluded that:
1 The current flowing in each of the conductor is 2 A.
2 The force between the conductor is attractive
3 The current flowing in each of the conductor is 4 A

41. The displacement of a particle undergoing simple harmonic motion is given by $x = 8\sin(100t)$, where x is measured in cm. Which of the following statement is correct?
1 the frequency of oscillation is 16 Hz
2 The velocity is given by $v = 800\cos(100t)$
3 The displacement after is 8 cm

42. The wavelength of light emitted by a Helium-Neon laser is 6.33×10^{-7} m. Which of the following is/are correct?
1 The light is emitted when electron are pumped up to higher energy level
2 The light is monochromatic because all the photons have the same wavelength.
3 They corresponds to a photon of 1.96 eV.

43. A dielectric increases the capacitance of a capacitor by
1 Increasing the strength of the electric field between the plates of the capacitor.
2 Drawing electrons off the negative plate to the positive plate.
3 Reducing the potential difference between the plates of the capacitor.

2019/0780/1/B/MCQ

44 A water pump raises water through a height of 4m at the rate of 600 kg per minute delivering it with a velocity of 10 ms^{-1}
1 The increase in potential energy per second is 392 W.
2 The power output of the pump is 892W
3 The increase in the kinetic energy is 2.5×10^4J

45. A cell of e.m.f 9.0 V and negligible internal resistance is connected in series with a 50 ohms resistor, R, using very thin resistance wire of resistance per unit length of 4.0 ohms per unit length. The circuit is shown in figure 10.
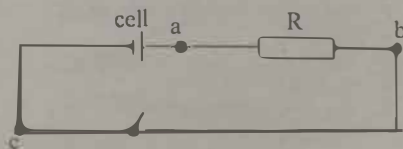

Figure 10

Which of these is/are true?
1 a is at a lower potential than b.
2 b is at a higher potential than c
3 a is at a higher potential then c

SECTION III (five questions)
Questions: 46 - 50

Direction: 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.
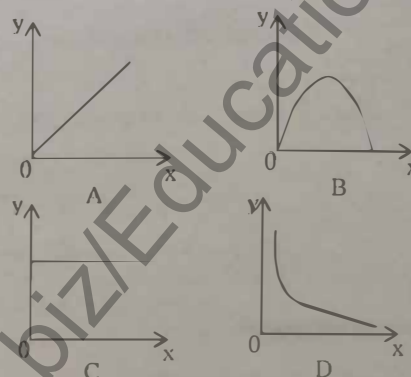
y	x
Total energy for a body in SHM	Time

Figure 11

47.

Y	x
Electric field outside a charged sphere	Distance from the surface of the charge

Figure 12

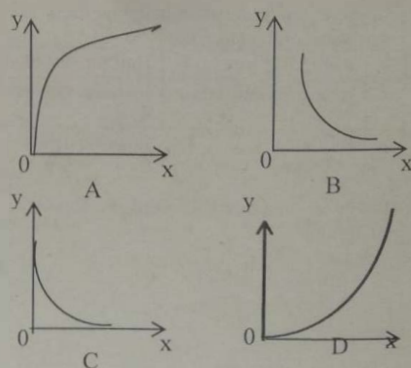Go on to the next page

48.

y	x
Resistance of a thermistor with a negative temperature coefficient of resistance	temperature
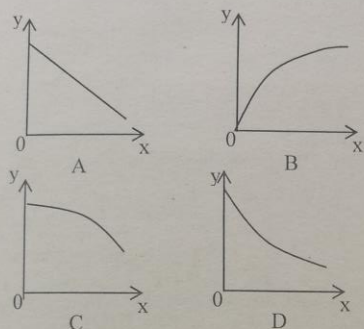
Figure 13

50.

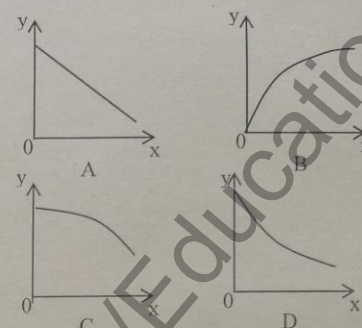| y	x
Current in an inductive coil when switch off	Time

Figure 15

49.

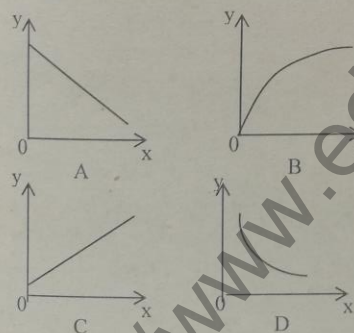| Y	X
The mean square speed of gas particles	Density of the particles

Figure 14

STOP

NOW GO BACK AND CHECK YOUR WORK

2019/0780/1/B/MCQ