CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

780 PHYSICS 1

JUNE 2015   **ADVANCED LEVEL**

Centre Number	
Centre Name	
Candidate 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 – 780 PHYSICS 1"

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 Number and Name, Centre Number and Name.
   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. 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 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] [C] [D]

8. 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.

9. 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.

10. Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.

11. At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet after. **DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

12. The use of calculators and Formulae books are allowed.

_____ Turn Over

SECTION I (Thirty five questions)

Question: 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. $kg\ m^2\ S^{-3}$ are base units of,
   A Work
   B Moments.
   C Power.
   D Impulse.

2. Which of the followings sets of physical quantities, x, y and z contain one vector and two scalar quantities.

	X	Y	Z
A	Force	Torque	Momentum
B	Acceleration	Velocity	Electric Field Strength
C	Pressure	B-Field	Energy
D	Mass	Work	Temperature.

3. Scientists recommend that the low power He-Ne lASER be used for school laboratory optical Experiments.Their reason could be that:
   A It produces a coherent beam.
   B It is produced by the stimulated emission of radiation
   C It produces a beam of light of a single frequency. That is a monochromatic beam.
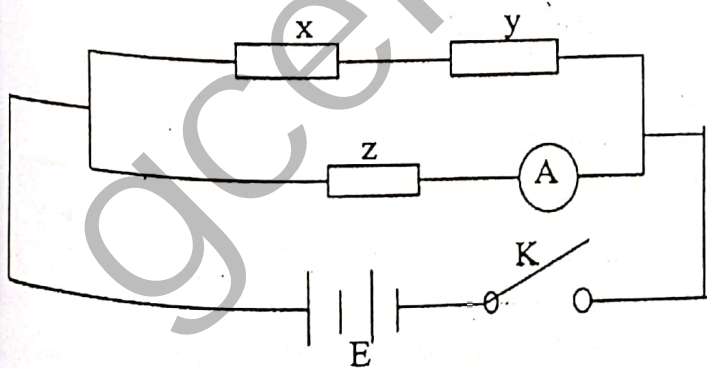   D It is for safety reasons.

Figure I

4. Figure I shows how three identical resistors x, y, and z may be connected in an electrical circuit. Whenthe switch, K, is closed the current through the battery, E, is 4.5 A. The reading of the ammeter of negligible resistance would be:
   A 3A.
   B 1.5 A.
   C 2.25 A.
   D 4.5 A.

5. Light of wavelength 590 nm is incident normally on a grating of 8.0×10^5 lines per meter. The number ofpossiblediffraction maxima obtained is
   A 5
   B 4
   C 3
   D 2

6. Which of the following wave type labeled A to D correctly matches its method of detection?

	Wave Type	Method of Detection
A	Infra-red	Receiver Aerials
B	Light	Photo cells
C	Gamma	Thermopiles
D	Radio	G.M. Tubes

7. Which of the following statements about the motion of objects can NEVER be true?
   A A body's speed can change without the object accelerating.
   B A body can be accelerating while moving at a constant speed.
   C A boy can move as a result of a constant resultant force acting on it.
   D A body's velocity can change at constant speed.

8. Two ball bearings x and y are dropped vertically from a height of 1 km above the earth's surface. They are initially atrest. The mass of y is half that of x. Neglecting air resistance, which correct?
   A The time taken by x to reach the ground would be twice that taken by y.
   B The time taken by x to reach the ground would be half that taken by y.
   C Y would reach the ground before x.
   D The time taken by x and y to reach the ground will be the same.

9. Suppose a light spring is loaded with a mass of 50×10^{-3} kg and it extends by 10×10^{-2} m. The force per unit displacement, K, and the period of oscillation are respectively,
   - A   5.0 N m^{-1} and 0.63 s
   - B   5.0 N m^{-1} and 0.314 s
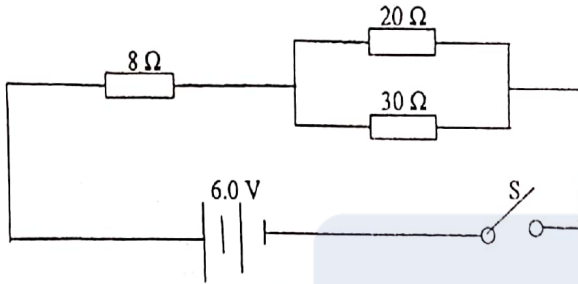   - C   5.0 N and 0.63 s
   - D   5.0 N s^{-1} and 0.314 s

10.

Figure 2

Figure 2 shows three resistors connected in a circuit. When the switch s is closed, the pd across the 30Ω resistor would be
   - A   2.4V
   - B   3.6 V
   - C   6.0 V
   - D   3.0 V

11. In an experiment to determine the velocity of sound in air, a vibrating tuning fork of an unknown frequency is stroked and held over the end of an open tube and the shortest length which gives a loud sound is 15.0 cm. Assuming that the speed of sound in air at room temperature is 330 m s^{-1}. The possible frequency of the tuning fork
   - A   515 Hz
   - B   256Hz
   - C   550Hz
   - D   220Hz

12. A snooker ball x moving with an initial velocity u, makes an elastic head-on collision with an identical stationary ball y. Which of the sets of velocities below correctly gives the velocities of x and y after the collision.

	X	Y
A	u/2	u/2
B	u	u
C	u	0
D	0	u

13.

4 A   2 A   Figure 3
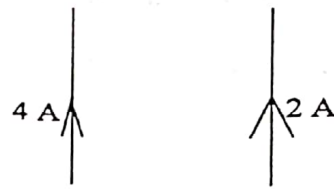
Figure 3 shows two long straight wires x and y placed parallel to each other a distance of 1m apart, carrying currents of 4 A and 2 A in the same direction. Which of the following gives the correct value of the B-field due to the wires at a point midway between the wires if $\mu_o = 4\pi \times 10^{-7}$ Hm^{-1}
   - A 2.4×10^{-6} T
   - B $8.8.0. \times 10^{-5}$ T
   - C 6.4×10^{-5} T
   - D 8.0×10^{-4} T.

14. A piece of wire of Young's modulus 2.0×10^{11} Pa, of diameter 2.0 mm and of length 2.0 m is suspended from a fixed point and a weight of 50 N attached to its free end. If the elastic limit of the material is not exceeded, then the material would extend by
   - A 3.98×10^{-4} m
   - B 7.66×10^{-4} m.
   - C 1.59×10^{-4} m
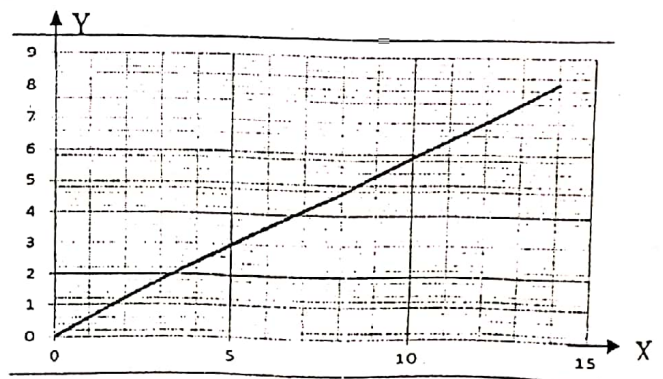   - D 3.18×10^{-4} m.

15.

Figure 4

Figure 4 is the outcome of an experiment to determine the specific heat capacity of a metal of 60 kg heated at a constant rate of 1.5×10^3 J s^{-1}. The Y-axis is temperature in degree Celsius and X-axis time in seconds. From the graph, the specific heat capacity of the metal is,
   - A   10.9 J kg^{-1} K^{-1}
   - B   36.6 J kg^{-1} K^{-1}
   - C   12.6 J kg^{-1} K^{-1}
   - D   25   J kg^{-1}K^{-1}

Turn over

16. The earth exerts a force of 9.8 N on a 1kg mas at its surface of radius R_E. Suppose the 1 kg mass is moved to a point at a height 3 times (thrice) the earth's radius ($3R_E$) above the earth's surface, then the force on the I kg mass becomes,.
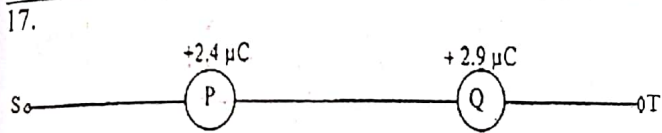   A   3.3 N
   B   2.5 N
   C   1.1 N.
   D   0.61N

17.

+2.4 µC   +2.9 µC

S⊙——————(P)————————(Q)————————⊙T

Figure 5

Figure 5 shows two point charges of magnitudes +2.4µC and +2.9µC located at points P and Q along a straight line ST.
   A   It is not possible for the resultant electric field due to these charges to be zero any where along the line between P and Q
   B   The point where the resultant electric field due to these charges is zero lies at a point midway between P andQ
   C   The point where the resultant electric field due to these charges is zero lies at a point between P and Q that is closer to Q than to P
   D   The point where the resultant electric field due to these charges is zero lies at G point between P and Q that is closer to P than to Q.

18. A sample of gas has a volume of $1.5 \times 10 m^3$ at a pressure of 3.0×10^5 Pa. Its new volume when thepressure is reduced byhalf at constant temperature would be
   A $0.75 \times 10^{-3} m^3$
   B $4.5 \times 10^{-3} m^3$
   C $3.0 \times 10^{-3} m^3$
   D $1.5 \times 10^{-3} m^3$

19. The resistivities of copper and aluminum are $1.7 \times 10^{-80} \Omega m$ and $2.6 \times 10^{-80} \Omega m$ respectively. What would be the diameter of a copper wire which would have the same resistance and of equal length as that of the aluminium wire of diameter 1.5mm.
   A   1.85 mm
   B   1.20 mm
   C   3.4 mm
   D   0.98 mm

20. Which of the following materials have a positive temperature coefficient of resistance?
   A   Silicon
   B   Copper
   C   Carbon
   D   Wood

21. A Toshiba T.V. set is rated at 1500 W. How much is the costs of watching a football match which lasted for one and a half hours on this set if a unit ofelectricity by AES SONEL is 60 francs?
   A   9000 frs
   B   90 frs
   C   60 frs
   D   135 frs.

22. One of the biggest advantage of fusionover fission as a source of energy is that fusion is an environmentally friendly source of energy. This means that
   A   Fusion occurs at extremely high temperatures
   B   Raw material for fusion is readily available and in abundance
   C   Waste products from fusion do not result in gene mutation
   D   Users of fusion power are friendly to each other

23. Which of the following sets of statements is true for alpha, gamma and Beta particles?

	Alpha-particle	Beta-particle	Gamma-Rays
A	Affects a photograp hic plate	Does not affect a photographic plate	Affect a photographi c plate
B	Un deflected bv a B-field	Deflected by a B-field	Un deflected by a B-field.
C	Deflected bv an E-field.	Deflected by an E-field	Un-deflected by an E-field.
D	Moves at light's speed	Moves at speed less than that of light	Have the same speed as light

24. When an electron in an atom makes a transition from an energy level at -1.5 e V to an energy level at-3.5eVan electromagneticradiationoccurs. If Planck'sconstantis6.6x10⁻³⁴ Js and 1eVis1.6x10⁻¹⁹J then the type of electromagnetic radiation emitted is

   A   X-rays
   B   Radio waves
   C   Infra-red rays
   D   Visible

25. A radioactive decay series begins with $^{232}_{90}Th$ involves the emission in turns of the following: 2 alpha particlesand 2 Beta particles. The final product is likely to be

   A $^{224}_{88}Ra$
   B $^{226}_{86}Rn$
   C $^{227}_{85}At$
   D $^{230}_{82}Pb$

26.
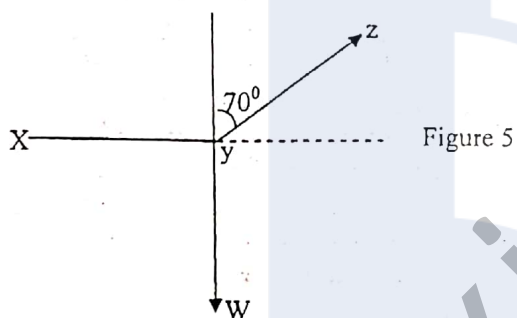
Figure 5

Figure 5 shows a weight w which hangs vertically from a string x, y, z by a thread tied to the string at y. The section xy is horizontal and section xy is at 70⁰ to the vertical.The tension in the portion xy would be

   A   w/tan70⁰
   B   w tan70⁰
   C   w tan 20⁰
   D   w sin 70⁰.

27. Which of the following statements about the potential energy and the force for two molecules is NOT true?

   A   The potential energy and the force at infinity approximates to zero
   B   The potential energy is smallest at equilibrium separation.
   C   The potential energy and the force are equal at the equilibrium separation.
   D   At equilibrium separation the force between the two molecules is zero.
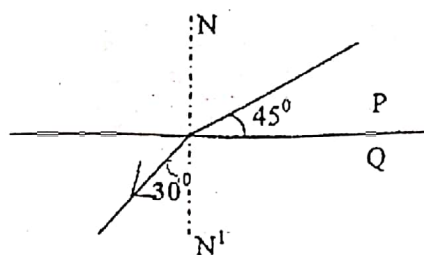
28.

Figure 6

Figure 6 shows waves travelling from medium P to medium Q. If the velocity of the wave in medium Q is 2.0 x 10⁻¹ms⁻¹ then the velocity of the wave in medium P would be,

   A   3.0 x 10⁸m s⁻¹
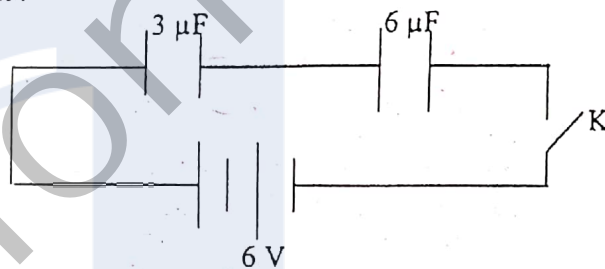   B   2.3x10⁻¹m s⁻¹
   C   3.4 x 10⁻¹m s⁻¹
   D   2.8 x 10⁻¹m s⁻¹

29.

Figure 7

Figure 7 shows how a3μF and a 6μFcapacitor may be connected in a circuit in series with a battery of 6V. Which of the following statements is NOT true for the circuit, when K is closed?

   A   The effective capacitance of the circuit is 2.0 x 10⁻⁶F.
   B   The total energy stored by the capacitors is 3.6 x 10⁻⁵ J
   C   The pd across the 3 μF is half the pd across the 6 μF.
   D   The pd across the 3 μF is twice the pd across the 6 μF..

30. A meter has a resistance of 75 Ω and gives a full scale deflection with a current of 1.0 x 10⁻³A. In order to adapt this meter to read a current of 1 A it is necessary to connect

A	75 mΩ resistor in parallel with the meter
B	75 mΩ resistor in series with the meter
C	75Ω resistor in parallel with the meter
D	75Ω resistor in series with the meter

6

31. A cylinder contains 12 liters (ℓ) of oxygen at20⁰C, and 15 atmospheres (atm.). The temperature is raised to 35⁰C, and the volume is reduced to 8.5 ℓ . The final pressure of the gas in atmospheres

A	20.1 atm
B	11.2 atm
C	22.3 atm
D	22.5 atm

32. Which of the following statements about a bipolar transistor is true?
   A The collector current is always greater than the base current.
   B The emitter current is always less than the collector current.
   C The base emitter voltage is always equal to the input voltage.
   D The base current is greater than the collector current.

33. When a parallel beam of light is incident at the Brewster angle in air on the surface of a glass block, someof the light is reflected and some refracted. Which of the following statements about these rays is true?
   A Both the refracted and the reflected rays are completely plane polarized in the same plane.
   B The angle between the refracted ray and the reflected is 90⁰
   C The refracted ray and the incident ray are at right angles to each other.
   D Only the refracted ray is plane polarized.

34. Which of the following statements is true for Young's double slit experiment?
   A Doubling the slit spacing only would double the fringe separation.
   B Doubling both the slit -screen distance and the slit separation would decrease the fringe separation
   C Reducing the slit -width by half only would double the fringe separation.
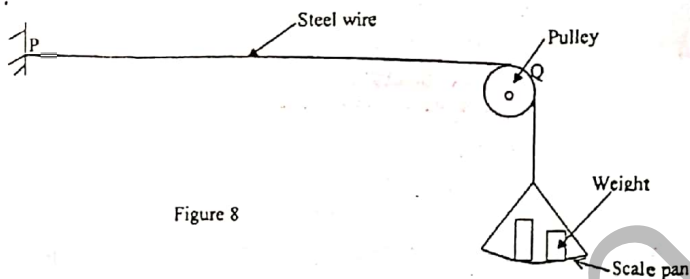   D Changing the slit width has no effect on the fringe separation.

35.

Figure 8

Figure 8 shows a steel wire with one end fixed at the point P while the other end is passed over the pulley Q, and attached to the scale pan carrying weights. Which of the following statements is true about the speed oftransverse waves in the section PQ of the wire?

A	The speed increases with increase in the radius of the wire.
B	The speed increases with decrease in weight put on the scale pan.
C	The speed increases with increase in the weight put on the scale pan.
D	The speed does not depend on the thickness of the wire.

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

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

36. Which of the following statements is/are true for any Electric field?

1 The lines of force originate from the negative charge and terminate on the positive.
2 The lines of force are usually smooth curves which touch each other.
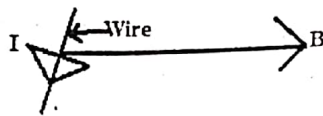3 The strength of the Electric field can be measured from the density of the lines.

37.

Figure 9

Figure 9 shows a horizontal length of current-carrying copper wire, placed in the plane of the paper; containing a uniform magnetic field such that the wire is perpendicular to the field. If the current flowing through the wire is 28 A and the mass per unit length of wire is 46.6 g m^{-1}, then,

1. The current-carrying wire can be made to float in the magnetic field, as shown on figure 8
2. The magnitude of the minimum magnetic field needed to suspend the wire is 1.6×10^{-2} T
3. The direction of the field needs to be reversed for the wire to float or be suspended.

38. The half-life of a radioactive nuclide is

1. A fundamental property of the nuclei.
2. A function of its mass number.
3. Depends on its atomic number.

39. If the collision between two bodies x and y is described as elastic, this would mean that,

1. The relative speed of separation is equal to the relative speed of approach between the two bodies.
2. The total energy of the system is conserved
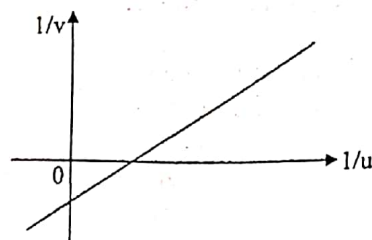3. The impulse is continuously changing.

40.

Figure 10

Which of the following statements is/are correctly deduced from the graph of figure 10?

I	The slope of the graph is the focal length of the lens.
2	The slope of the graph is the reciprocal of the focal length.
3	The intercept of the graph is the reciprocal of the focal length.

41. Which of the following sets of quantities x and y vary according to the inverse square law.

	x	y
1	Potential due to a point charge	Distance from the point charge
2	Force of attraction between two masses	Distance between the masses
3	The E-field due to a point charge	Distance from the point charge

42. Which of the following statements is/are true about forces?

1. Gravitational and magnetic forces are both action-at-distance forces.
2. All action-at-a distance forces obey the inverse square law.
3. All forces between elementary particles and friction are contact forces.

43. The speed of five molecules in m s^{-1} is 10, 20, 30, 40, and 50 respectively. Which of the statements is/are true about the speeds of the molecules?

1. The mean square speed of the molecules is 90 m s^{-1}.
2. The root-mean square speed of the molecules is 74 m s^{-1}.
3. The mean square speed of the molecules is always greater than the root mean square speed.

Turn over

44 Which of the following statements is/are true of a coherent beam of light?

1 Their's rays have the same color.
2 The phase difference between the wave front is constant.
3 The waves must originate from two monochromatic sources.

45. Which of the following pairs of statements correctly matches energy losses in a transformer with its method of reducing energy lost?

| Energy losses	Method of reducing energy lost
1 Heat losses in the connecting wires	Use wires of larger diameters
2 Hysteresis losses	Replace iron with steel in the core
3 Flux linkage	Laminate the core.

SECTION III (five questions)
Question 46 - 50
Direction: *Each of the questions (46-50) has four sets of graphs A - D. Which of the graphs in each question bestfits the relationship between x and y?*
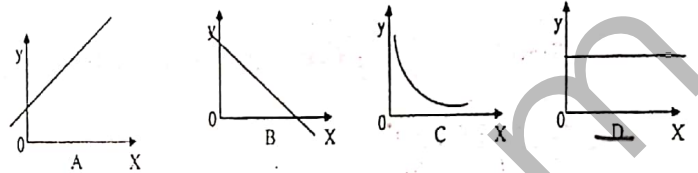
46.

y	x
The volume of a fixed mass of gas atconstant Pressure	Temperature in degree Celsius.
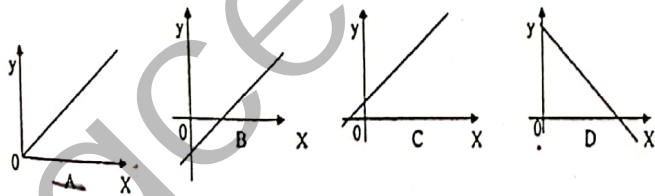
47.

y	x
Natural log of the pd across the platesof a discharging capacitor	time

48.

y	x
The stopping potential for photo electrons	Frequency ofincident wave
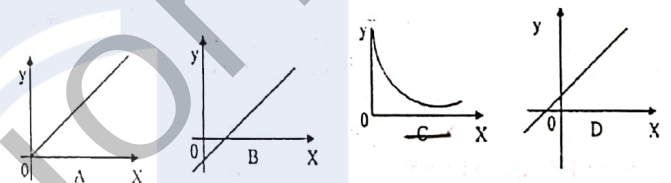
49.

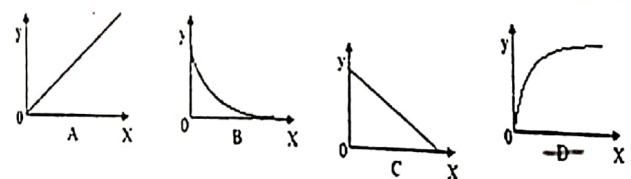| y	x
Resistance of Thermistor	Temperature in degree Celsius
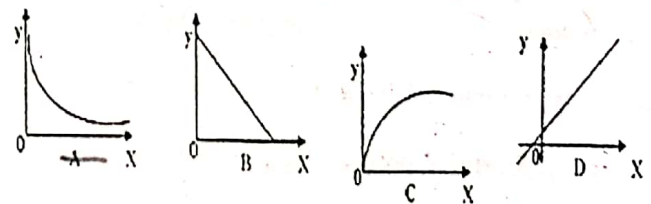
50.

y	x
Conductivity of silicon	Temperature

STOP - NOW GO BACK AND CHECK YOUR WORK