CANDIDATE – PLEASE NOTE!

PRINT your name on the line below and return this booklet with your answer sheet. Failure to do so may result in disqualification.

_____

TEST CODE **01238010**

FORM TP 2015099

MAY/JUNE 2015

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

PHYSICS

Paper 01 – General Proficiency

1 hour 15 minutes

04 JUNE 2015 (a.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 1 hour and 15 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.
4. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

   Sample Item

   The SI unit of length is the

   (A) newton
   (B) metre
   (C) kilogram
   (D) second

   Sample Answer

   Ⓐ ● Ⓒ Ⓓ

   The best answer to this item is "metre", so (B) has been shaded.
5. If you want to change your answer, erase it completely before you fill in your new choice.
6. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, go on to the next one. You may return to that item later.
7. Figures are not necessarily drawn to scale.
8. You may do any rough work in this booklet.
9. You may use a silent, non-programmable calculator to answer items.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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1. 0.0000462 N expressed in standard form is

(A) 4.62×10^{-5} N
(B) 4.62×10^{-4} N
(C) 462×10^{-4} N
(D) 4.62×10^{5} N

2. One gram is equal to

(A) 10 milligrams
(B) 100 milligrams
(C) 1 000 milligrams
(D) 10 000 milligrams

3. A 4 kg mass is travelling with a constant speed of 5 m s^{-1}. It is brought to rest in 2 seconds. The average force acting on it to bring it to rest is

(A) 1.6 N
(B) 2.5 N
(C) 10.0 N
(D) 40.0 N

4. Which of the following measurements has three significant figures?

(A) 0.0293 kg
(B) 0.94 A
(C) 5.321 V
(D) 10.42 m

5. Which of the following quantities remain unchanged with an INCREASE in temperature?

(A) Mass
(B) Density
(C) Volume
(D) Relative Density

6. A boy measured the height of a laboratory table with a metre rule. Which of the following is MOST likely to be correct?

(A) 0.00895 m
(B) 0.0895 m
(C) 0.895 m
(D) 8.95 m

7. The kinetic energy of a body of mass, m, and velocity, v, is given by

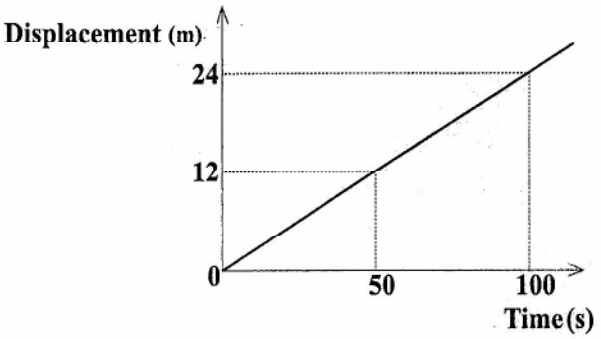
(A) $\frac{m}{v}$

(B) mv

(C) $\frac{mv^2}{2}$

(D) mv^2

Item **8** refers to the following graph.



8. The graph above shows how the displacement of a runner from a starting line varies with time. This runner is

(A) not moving
(B) going at a steady speed
(C) going faster and faster
(D) going slower and slower

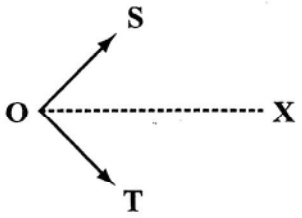
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9. A falling raindrop reaches a constant speed when

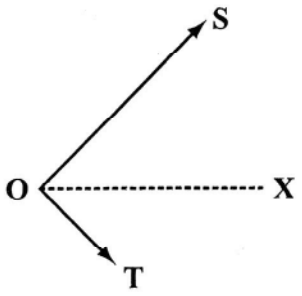
(A) there is no net force acting on it
(B) the upthrust due to the air is at a minimum
(C) the pull of the earth on the raindrop is equal to the weight of the raindrop
(D) the air surrounding the raindrop becomes saturated with water vapour

10. The diagrams below, **drawn to scale**, represent two forces, S and T, acting at O. In which of the following is the resultant in the direction, OX?

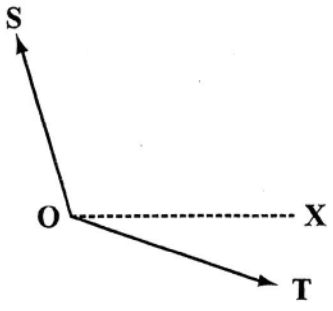
(A)



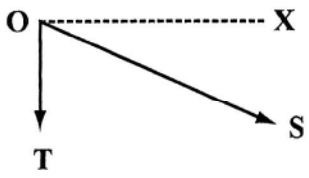
(B)



(C)



(D)



11. When a force F is applied to a spring of original length L, the new length becomes $L+x$. What would be the new length of the spring if a force of $\frac{F}{2}$ was applied instead?

(A) $L+2x$

(B) $2(L+x)$

(C) $L+x$

(D) $L+\frac{x}{2}$

12. Which of the following units is for momentum?

(A) kg s^{-1}
(B) kg m s^{-1}
(C) kg m s^{-2}
(D) N m

13. When two bodies collide momentum is conserved. This means that the

(A) kinetic energy before impact is equal to that after impact
(B) momentum of each body is unchanged
(C) algebraic sum of the velocities before impact is equal to the sum of the velocities after impact
(D) total momentum of the bodies before impact is equal to the total momentum of the bodies after impact

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14. Power can be defined as

(A) force × distance moved

(B) $\frac{\text{force}}{\text{time}}$

(C) $\frac{\text{work done}}{\text{time}}$

(D) work done × time

15. An object is removed from the ground and placed on a shelf. Which of its properties is expected to increase?

(A) Mass
(B) Volume
(C) Potential energy
(D) Kinetic energy

16. Pressure in a liquid can be calculated using the formula

$P = \rho gh$

Which sets of units below will give the pressure in the SI unit?

	ρ	g	h
(A)	g cm^{-3}	m s^{-2}	mm
(B)	kg m^{-3}	N kg^{-1}	m
(C)	g cm^{-3}	N kg^{-1}	m
(D)	kg m^{-3}	cm s^{-2}	cm

17. A bubble of gas rises to the surface of a soft drink. This is because the

(A) density of the gas is greater than the density of the drink
(B) upthrust on the bubble is greater than the weight of the bubble
(C) upthrust on the bubble is greater than the weight of water it displaces
(D) weight of the water displaced by the bubble is less than the weight of the bubble

18. Boyle's law for a gas can be tested experimentally, provided which of the following is/are maintained constant?

I. Temperature
II. Pressure
III. Density
IV. Mass

(A) III only
(B) I and II only
(C) I and IV only
(D) I, II and III only

19. A light bulb is filled with a gas at a temperature of 293 K. If the initial pressure of the gas is P, what will it be when the temperature increases to 360 K?

(A) $\frac{393}{360} \times P$

(B) $\frac{360}{293} \times P$

(C) $\frac{293}{360} \times \frac{1}{P}$

(D) $\frac{360}{293} \times \frac{1}{P}$

20. Which of the following ranges of temperature is MOST suitable for a clinical thermometer?

(A) 0 °C to 44 °C
(B) –10 °C to 110 °C
(C) 35 °C to 100 °C
(D) 35 °C to 44 °C

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21. The specific heat capacity of a material is the energy required to

(A) melt 1 kg of the material with no change of temperature
(B) change the temperature of the material by 1 K
(C) change 1 kg of the liquid material to 1 kg of gas without a change in temperature
(D) change the temperature of 1 kg of the material by 1 K

22. In the pressure law, which of the following statements is/are true?

I. Ratio of pressure to Kelvin temperature is constant.
II. Volume is constant.
III. Pressure is constant.

(A) I only
(B) III only
(C) I and II only
(D) I, II and III

23. Which of the following statements concerning the radiation of heat is true?

I. Radiation can only take place in a material medium.
II. A good absorber is also a good emitter of radiation.
III. Dark dull surfaces are better emitters than shiny ones.

(A) III only
(B) I and II only
(C) I and III only
(D) II and III only

24. An electric kettle full of water is plugged into the mains. The process by which heat travels through the water is

(A) electrification
(B) convection
(C) evaporation
(D) radiation

25. There are NO attractive forces between the molecules in a

(A) liquid and gas
(B) solid and a liquid
(C) liquid
(D) gas

26. A gas occupies 2 m^3 at 27 °C and at a pressure of 1 atmosphere. At a pressure of 2 atmospheres it occupies a volume of 1 m^3. What is its temperature at this new volume and pressure?

(A) 54.0 °C
(B) 27.0 °C
(C) 6.75 °C
(D) – 198 °C

27. Which of the following is the correct relation between the wavelength, λ, speed, υ, and frequency, f, of a wave?

(A) $\lambda = f\upsilon$

(B) $f = \frac{\lambda}{\upsilon}$

(C) $f = \frac{\upsilon}{\lambda}$

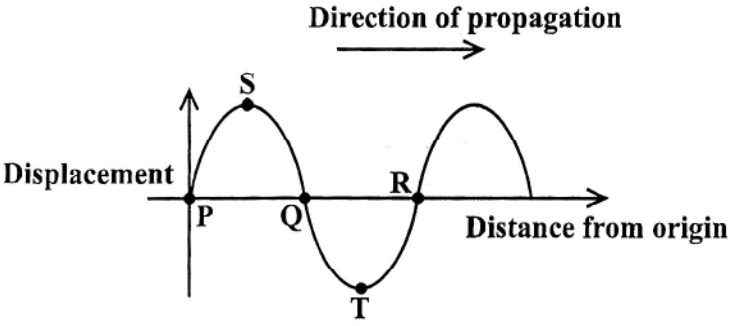
(D) $\lambda = \frac{f}{\upsilon}$

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28. Which of the following waves are NOT transverse waves?

(A) Water waves on the sea
(B) Light waves from a street lamp
(C) Sound waves from a guitar string
(D) Radio waves travelling from a satellite

Item **29** refers to the following diagram.

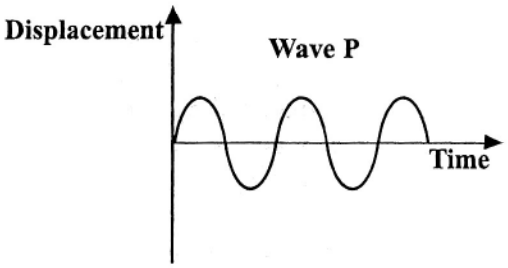


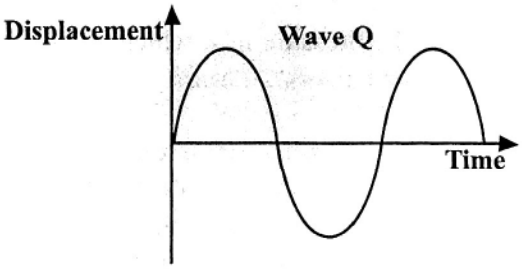
29. Which of the following statements about the wave shown in the diagram above is/are true?

I. Points P, Q and R are in phase.
II. Points S and T are out of phase.
III. The wavelength of the wave is the distance PR.

(A) I only
(B) II only
(C) I and II only
(D) II and III only

Item **30** refers to the following graphs (with axes having the same scales) of two sound waves, P and Q.





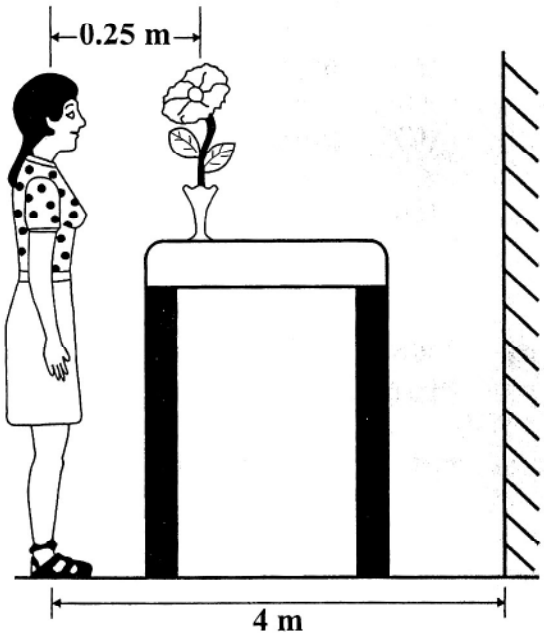
30. Which of the following statements is true?

(A) P is louder than Q but Q has a higher pitch.
(B) P is louder than Q and also has a higher pitch than Q.
(C) Q is louder than P but P has a higher pitch.
(D) Q is louder than P and also has a higher pitch than P.

31. The normal hearing range of a young person is about

(A) 20 Hz to 2 000 Hz
(B) 20 Hz to 20 000 Hz
(C) 200 Hz to 2 000 Hz
(D) 200 Hz to 20 000 Hz

Item 32 refers to the following diagram which shows a lady facing a plane mirror which is 4.0 m away from her..



32. The lady views the image of a vase, which is 0.25 m in front of her. How far from her is the image of the vase?

(A) 3.75 m
(B) 4.25 m
(C) 7.75 m
(D) 8.00 m

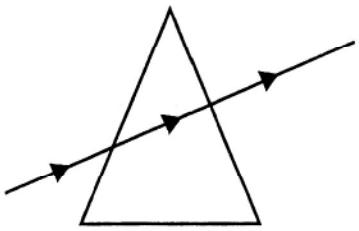
33. Which of the following events does NOT suggest that light travels in straight lines?

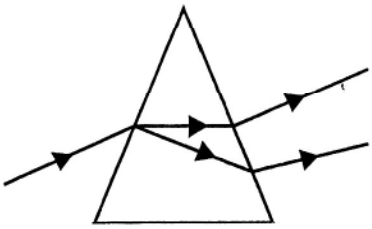
(A) Sunbeams streaming through trees
(B) A rainbow formation in the sky
(C) The formation of shadows
(D) Light from a projector on its way to a screen

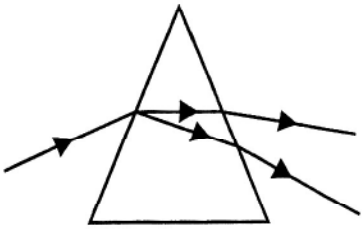
34. The specific latent heat of fusion of water is 340 kJ kg^{-1}. This means that when 10 kg of water freezes

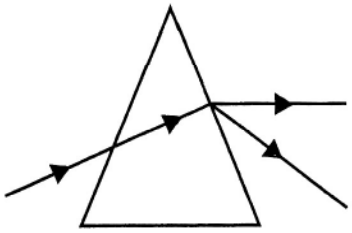
(A) 34 kJ of heat is absorbed
(B) 34 kJ of heat is given out
(C) 3 400 kJ of heat is absorbed
(D) 3 400 kJ of heat is given out

35. Which of the following diagrams BEST represents the passage of a beam of white light through a triangular glass prism?

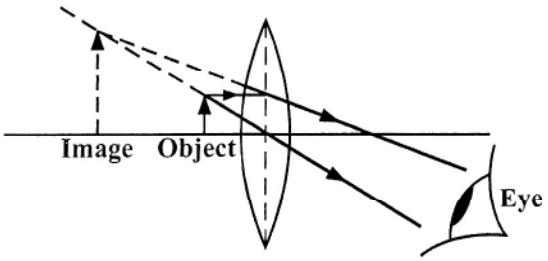
(A)


(B)


(C)


(D)


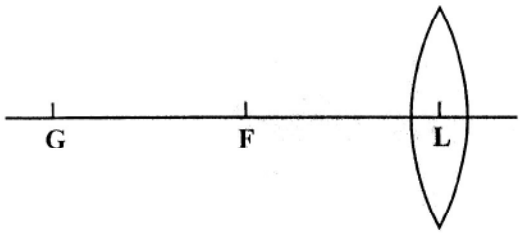
Item **36** refers to the following diagram.



36. The diagram above shows the formation of an image by a

(A) lens camera
(B) pin hole camera
(C) telescope
(D) magnifying glass

Item **37** refers to the following diagram which represents a thin converging lens, L, with a principal axis GL.



37. If FL is the focal length of the lens and GF = FL, then where should an object be placed so as to produce a virtual magnified image?

(A) At G
(B) To the left of G
(C) Between F and G
(D) Between L and F

38. A ray of light in air strikes a glass block at an angle of incidence of 0°. The light will be

(A) undeviated
(B) totally reflected
(C) refracted at 90° to normal
(D) refracted at an unknown angle

39. When a polythene rod is rubbed with a cloth, it becomes

(A) positively charged by gaining protons
(B) negatively charged by gaining electrons
(C) positively charged by gaining electrons
(D) negatively charged by losing protons

40. Which of the following statements about insulators are true?

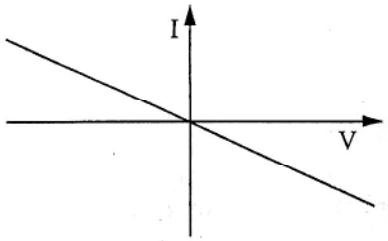
I. In an insulator all electrons are bound firmly to their atoms.
II. In an insulator many electrons can move freely from atom to atom.
III. An insulator cannot be charged by rubbing.
IV. A good insulator retains its charge better than a conductor.

(A) I and IV only
(B) I and II only
(C) II and III only
(D) I, II and III

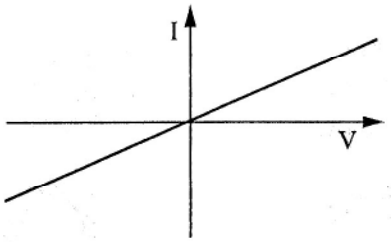
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41. Which of the following diagrams is a representation of the current/potential difference relationship for a metallic conductor at a constant temperature?

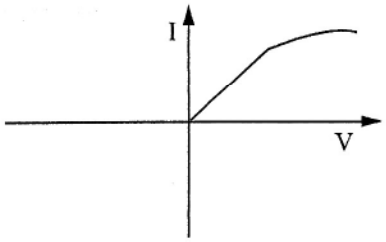
(A)



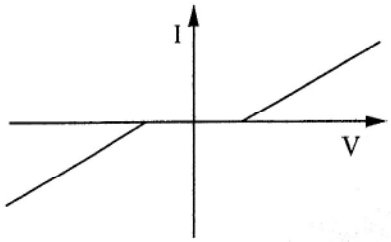
(B)



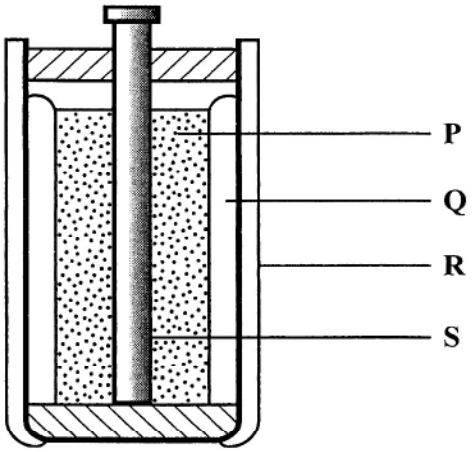
(C)



(D)



Item **42** refers to the following diagram which shows the cross section of a dry cell.

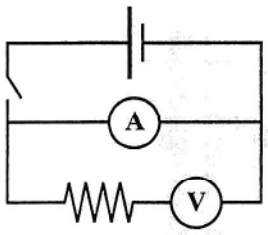


42. Which of the labelled parts is the electrolyte?

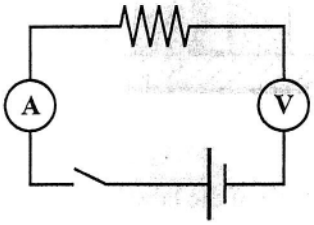
(A) P
(B) Q
(C) R
(D) S

43. A student requires a circuit to measure the resistance of a resistor. Which of the following circuits is correctly connected?

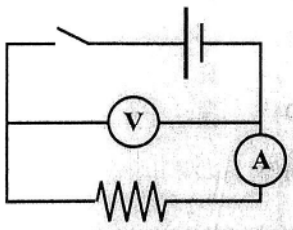
(A)



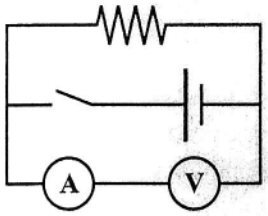
(B)



(C)



(D)



44. The refractive index of a transparent medium with a critical angle, c, for light travelling from the medium to air is

(A) $\frac{1}{c}$

(B) $\frac{90°}{\sin c}$

(C) $\frac{\sin 90°}{\sin c}$

(D) $\sin c$

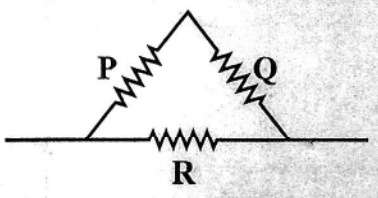
45. In domestic installation systems, which of the following components should be placed in the live wire?

I. Switches
II. Circuit breakers
III. Fuses

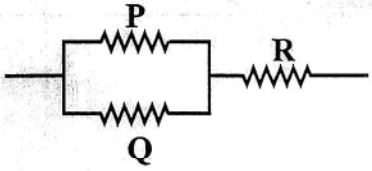
(A) I only
(B) III only
(C) II and III only
(D) I, II and III

46. In which of the following diagrams are resistors P and Q in series with each other and parallel with R?

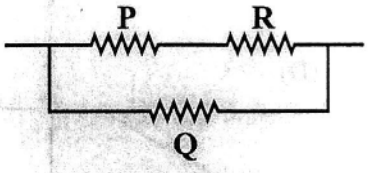
(A)



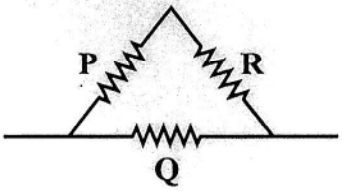
(B)



(C)



(D)



47. When a large current passes through a fuse, which of the following sequence of events is correct?

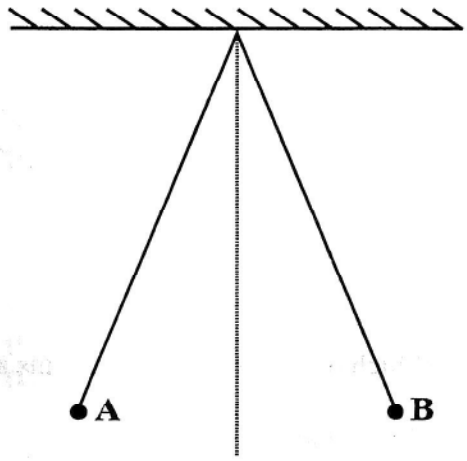
(A) Wire gets hot → wire melts → current is cut off
(B) Wire gets hot → current is cut off → wire melts
(C) Wire melts → current is cut off → wire gets hot
(D) Wire melts → wire gets hot → current is cut off

48. A semi-conductor diode produces half-wave rectification of alternating current. Which of the following statements is true?

I. The current obtained has a constant value.
II. The current obtained flows only in one direction.
III. There are periods when no current flows from the source.

(A) I only
(B) II only
(C) I and III only
(D) II and III only

Item **49** refers to the following diagram.



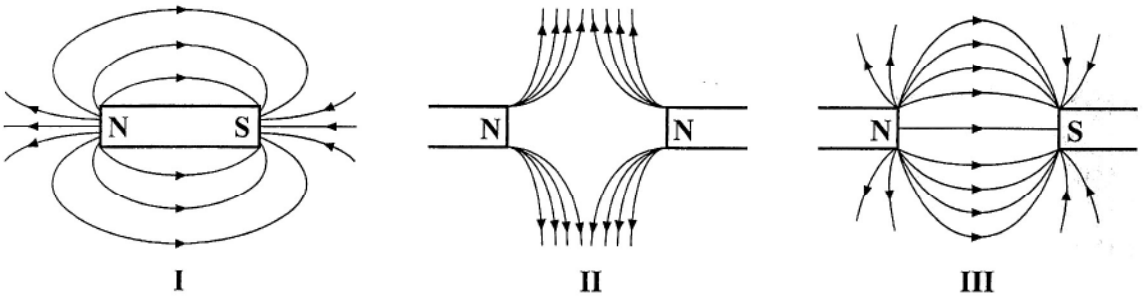
49. Two light aluminium spheres, A and B, are suspended by insulating threads. If they come to rest as shown in the diagram, the force keeping them apart is

(A) gravitational
(B) electrostatic
(C) magnetic
(D) centripetal

50. Which of the following statements about alternating current is true?

(A) It can be changed into direct current by a transformer.
(B) It can be rectified by using a semiconductor diode.
(C) It can be used to recharge a battery.
(D) It is used to transmit electrical energy because of its high frequency.

51. The following diagrams show the magnetic field lines plotted by a student.



I II III

Which of the following diagrams are correct?

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

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52. A transformer is used to

(A) alter the voltage
(B) alter the frequency
(C) convert direct current to alternating current
(D) convert alternating current to direct current

53. Rectification can BEST be done by using a

(A) transformer
(B) diode
(C) transistor
(D) capacitor

54. Which of the following is four times the mass of a proton?

(A) Alpha particle
(B) Beta particle
(C) Electron
(D) Neutron

55. J.J. Thompson discovered the electron. Which of the following physicists discovered the proton?

(A) Thompson
(B) Bohr
(C) Chadwick
(D) Rutherford

Items **56–57** refer to the following information.

Nucleus	Neutron Number	Proton Number
P	126	82
Q	126	83
R	125	82
S	146	92

56. Which pair of atomic nuclei are isotopes?

(A) P and Q
(B) Q and R
(C) P and R
(D) Q and S

57. Which two elements could occupy adjacent positions in the periodic table?

(A) P and Q
(B) P and R
(C) Q and S
(D) R and S

58. Which of the following scientists discovered radium?

(A) Marie Curie
(B) Isaac Newton
(C) Albert Einstein
(D) J.J. Thompson

59. Which of the following statements about radioactive decay are correct?

I. It is dependent on conditions external to the nucleus.
II. It is a random process.
III. It is due to changes in the nuclei of atoms.

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

60. Which of the following statements concerning an α-particle are true?

I. It has twice the charge of a proton.
II. It has twice the mass of a proton.
III. It has the same sign charge as a proton.

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.