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

FORM TP

MAY/JUNE 2017

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

PHYSICS

Paper 01 – General Proficiency

1 hour 15 minutes

07 JUNE 2017 (p.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) metre
   (B) second
   (C) newton
   (D) kilogram

   Sample Answer

   ● Ⓑ Ⓒ Ⓓ

   The best answer to this item is "metre", so (A) 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. An ice cube sinks in Liquid A but floats in Liquid B. Which of the following statements is true?

(A) The upthrust is less in Liquid A than in Liquid B.
(B) The upthrust is greater in Liquid A than in Liquid B.
(C) The weight of the ice cube is less in Liquid A than in Liquid B.
(D) The weight of the ice cube is greater in Liquid A than in Liquid B.

2. To measure the external diameter of a measuring cylinder most accurately, one should use a

(A) metre rule
(B) tape measure
(C) length of string
(D) pair of vernier callipers

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

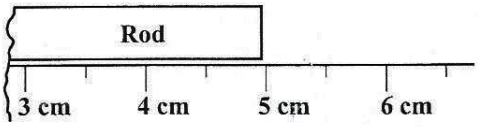
4. Which of the following measurements has three significant figures?

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

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

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

Item 6 refers to the following diagram of a rod and a centimetre rule used to measure the rod's length. The end of the rod (not shown) is at the zero mark on the rule.



6. The length of the rod should be written as

(A) 5 cm
(B) 5.0 cm
(C) 5.00 cm
(D) 4.97 cm

7. When an astronaut is standing on the moon his mass is 70 kg. When he returns to earth his approximate weight will be

(A) 70 kg
(B) 420 kg
(C) 70 N
(D) 700 N

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

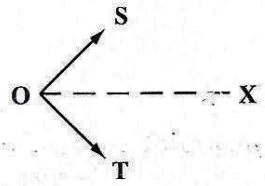
(A) Mass
(B) Volume
(C) Kinetic energy
(D) Potential energy

9. Which of the following features must be present in a stable, well-designed racing car?

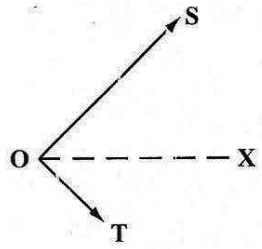
(A) Low centre of gravity
(B) Narrow wheel base
(C) Long front
(D) Sun roof

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?

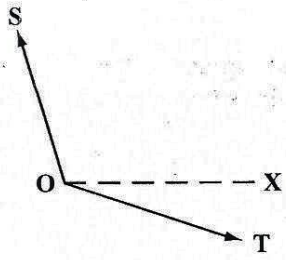
(A)



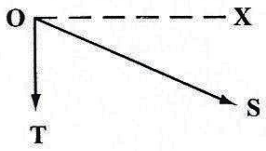
(B)



(C)



(D)



11. Which of the following expressions could be used to determine the speed of an object?

(A) $\frac{\text{Change in velocity}}{\text{Time taken}}$

(B) $\frac{\text{Change in displacement}}{\text{Time taken}}$

(C) $\frac{\text{Distance travelled}}{\text{Time taken}}$

(D) Distance travelled × Time taken

12. Which of the following is the unit of 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

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. The specific latent heat of vaporization of water is the energy required to change 1 kg of water at

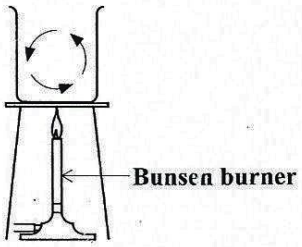
(A) 0 °C to ice at 0 °C
(B) 99.9 °C to steam at 100.1 °C
(C) 100 °C to steam at 100 °C
(D) 0 °C to steam at 100 °C

16. Which of the following is the POOREST conductor of thermal energy?

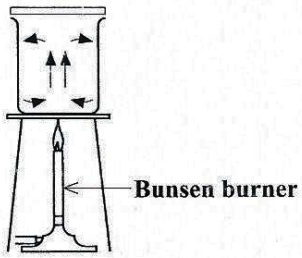
(A) Air
(B) Copper
(C) Mercury
(D) Aluminium

17. Which of the following diagrams BEST illustrates convection current in a liquid?

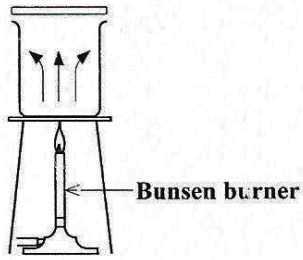
(A)



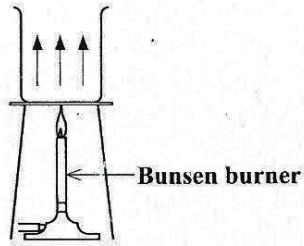
(B)



(C)



(D)



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

I. Temperature
II. Pressure
III. Mass

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

19. 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

20. As the temperature of a liquid rises

(A) its density increases
(B) the forces between its molecules increase
(C) the kinetic energy of its molecules increases
(D) the pressure it exerts at the bottom of the container increases

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. What is the gain in the gravitational potential energy of a body of weight 200 N, as it rises from a height of 30 m to a height of 35 m above the earth's surface?

(A) 40 J
(B) 100 J
(C) 1000 J
(D) 2000 J

23. Which of the following statements concerning the radiation of heat is/are 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

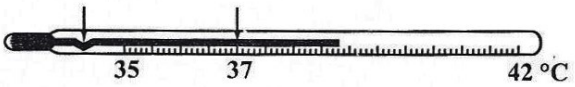
24. An electric kettle full of water is plugged into the mains. The process by which heat travels through the water is

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

25. There are little or no attractive forces between the molecules in a

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

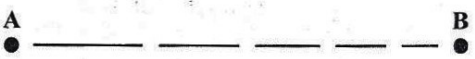
Item 26 refers to the following diagram of a clinical thermometer.



26. What temperature is indicated by the clinical thermometer in the diagram above?

(A) 38.3 °C
(B) 38.6 °C
(C) 38.7 °C
(D) 38.8 °C

Item 27 refers to the following diagram.



27. In using a slinky to demonstrate longitudinal waves moving from Point A to Point B above, the spring is made to vibrate

(A) parallel to AB
(B) perpendicular to AB
(C) at an obtuse angle to AB
(D) at an acute angle to AB

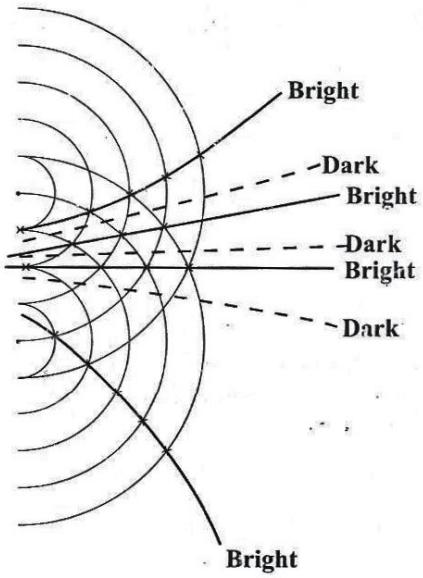
28. Sound waves propagated in a medium consist of

(A) crests followed by troughs
(B) compressions followed by troughs
(C) crests followed by rarefactions
(D) compressions followed by rarefactions

29. Which of the following statements does NOT provide evidence that sound waves can be reflected?

(A) Sound can be heard around a corner in open air.
(B) Speaking tubes can be used for passing messages in ships.
(C) The depth of the ocean can be measured using ultrasound.
(D) Echoes can be heard when a person shouts in a large empty room.

Item 30 refers to the following diagram in which two coherent light sources produce an interference pattern on a screen of bright and dark fringes.



30. The reason for the formation of the bright fringes is that

(A) these positions contain more light energy
(B) the crests are larger than the troughs along these lines
(C) all the crests and troughs are in phase along these points
(D) all the crests and troughs are out of phase along these points

31. Which row in the following table correctly compares X-rays and visible light?

	X-rays	Visible Light
(A)	Particles	Waves
(B)	High frequency	Low frequency
(C)	Long wavelength	Short wavelength
(D)	Carry less energy	Carries more energy

32. Which of the following, in the 20th century, provided evidence that light has a wave nature?

(A) Young's double slit experiment
(B) Newton's prism experiment
(C) Ripple tank experiment
(D) Photoelectric effect

33. Which of the following statements is NOT true of the image formed in a plane mirror?

(A) The image is upright.
(B) The image is laterally inverted.
(C) Rays of light from the object pass through corresponding points on the image.
(D) The image is the same distance behind the mirror as the object is in front.

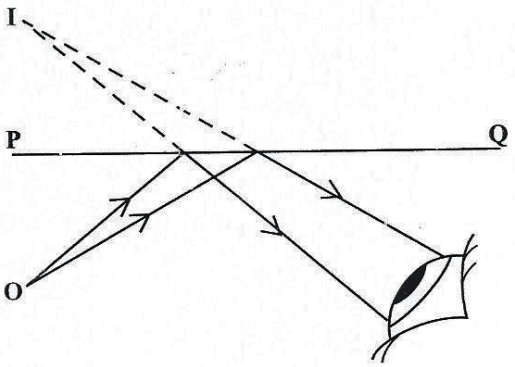
34. Which of the following can produce a diminished virtual image of a real object?

I. A plane mirror
II. A diverging lens
III. A converging lens

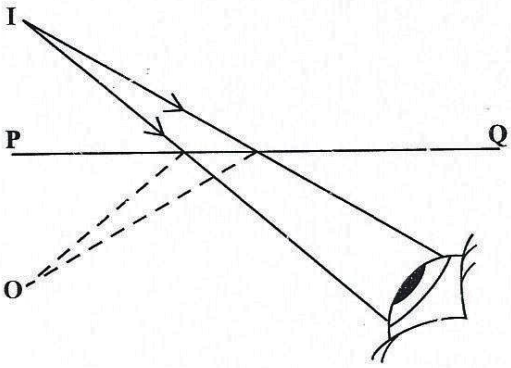
(A) I only
(B) II only
(C) II and III only
(D) I, II and III

35. An object, O, is viewed in a plane mirror, PQ. Which of the following diagrams correctly shows how the image is formed?

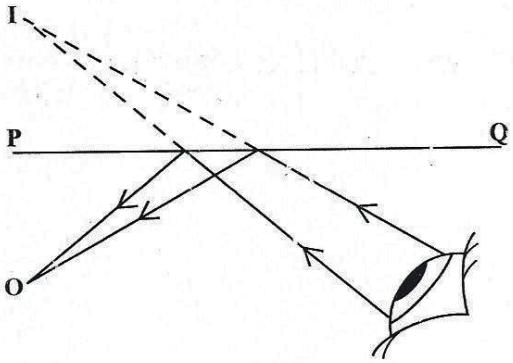
(A)



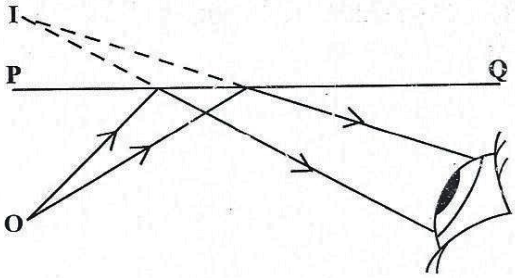
(C)



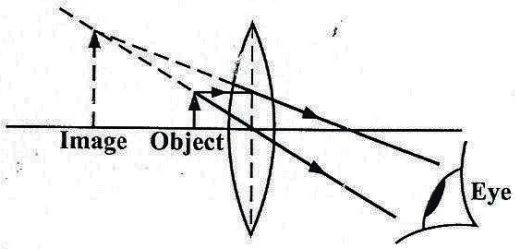
(B)



(D)



Item 36 refers to the following diagram.



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

(A) lens camera
(B) pinhole camera
(C) telescope
(D) magnifying glass

37. Which of the following statements about sound is NOT correct?

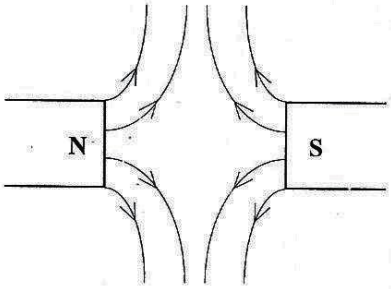
(A) Sound travels more slowly than light.
(B) Sound does not travel through a vacuum.
(C) Sound is transmitted as transverse waves.
(D) Sound may be produced by vibrating systems.

38. A loud high-pitched note results from a wave of

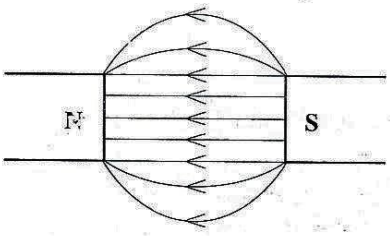
(A) high frequency, small amplitude
(B) high frequency, large amplitude
(C) low frequency, large amplitude
(D) low frequency, small amplitude

39. Which of the following diagrams represents the magnetic field which exists between two opposite magnetic poles?

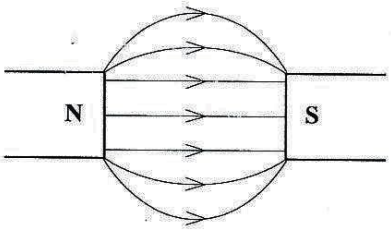
(A)



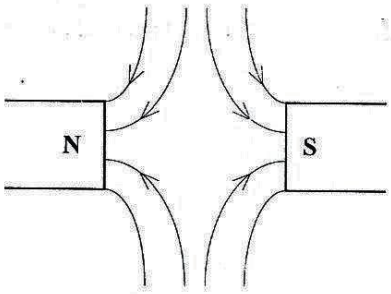
(B)



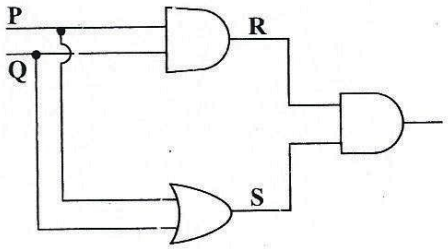
(C)



(D)



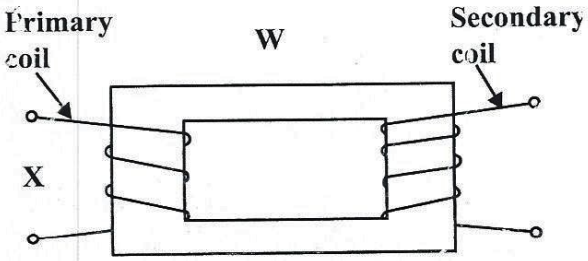
Item **40** refers to the following diagram.



40. What is the output at R and S when a 0 0 input is made at P and Q?

	R	S
(A)	0	0
(B)	1	1
(C)	0	1
(D)	1	0

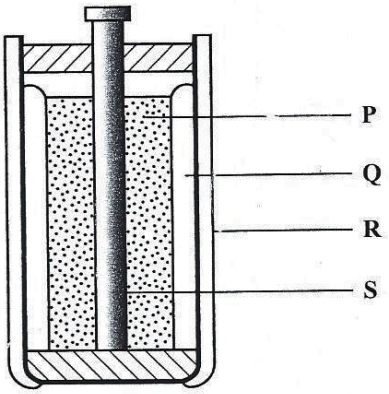
Item **41** refers to the following diagram.



41. Appropriate labels for W and X would be

	W	X
(A)	step-down transformer	a.c. input
(B)	step-down transformer	d.c. input
(C)	step-up transformer	a.c. input
(D)	step-up transformer	d.c. input

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. Which of the following equations CANNOT be used to determine the power dissipated in a resistor?

(A) $P = I^2R$

(B) $P = VI$

(C) $P = \frac{R}{V^2}$

(D) $P = \frac{V^2}{R}$

44. A ray of light leaving air enters glass of refractive index 1.6. The angle of refraction is 27°. What is the sine of the angle of incidence?

(A) $1.6 + \sin 27°$

(B) $\dfrac{1.6}{\sin 27°}$

(C) $1.6 \sin 27°$

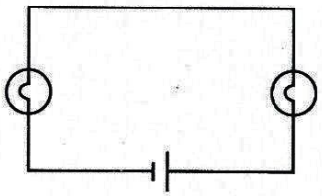
(D) $\dfrac{\sin 27°}{1.6}$

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

I. Switches
II. Circuit breakers
III. Fuses

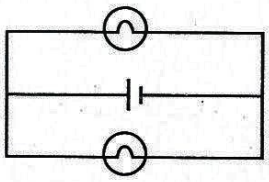
(A) I only
(B) III only
(C) II and III only
(D) I, II and III

Item 46 refers to the following diagram which shows an electric circuit with a cell and two filament bulbs.

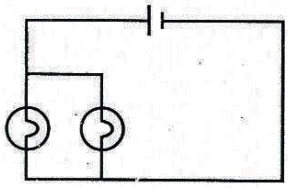


46. Which of the following circuits is electrically the same as the circuit above?

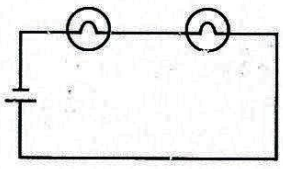
(A)



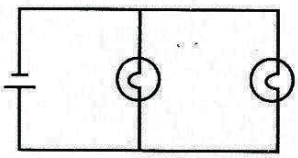
(B)



(C)



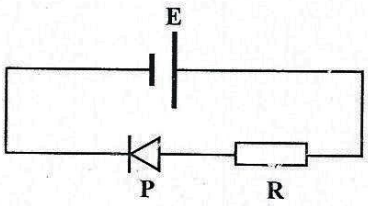
(D)



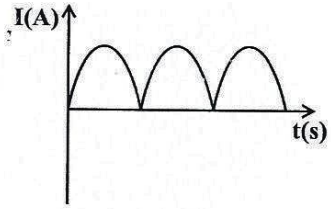
47. When a large current passes through a fuse, which of the following sequence of events is correct?

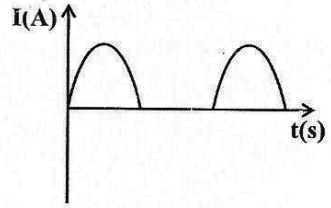
(A) Wire gets hot → current is cut off → wire melts
(B) Wire gets hot → wire melts → current is cut off
(C) Wire melts → current is cut off → wire gets hot
(D) Wire melts → wire gets hot → current is cut off

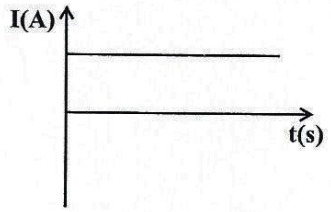
Item 48 refers to the following diagram which shows a cell E, a diode P, and a resistor R, connected in series.

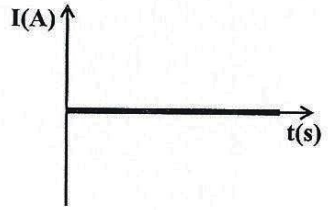


48. Which of the following graphs BEST illustrates the current through R?

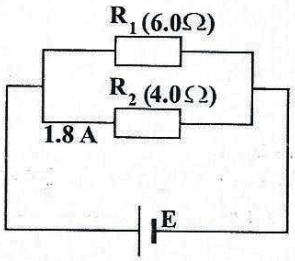
(A)


(B)


(C)


(D)


Item 49 refers to the following diagram which shows two resistors, R_1 of 6.0 Ω and R_2 of 4.0 Ω, in parallel.

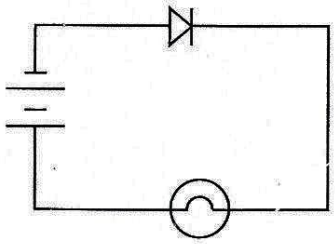


49. What is the current through R_1 if the current through R_2 is 1.8 A as recommended?

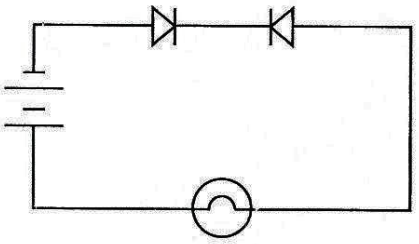
(A) 1.2 A
(B) 1.8 A
(C) 2.7 A
(D) 3.0 A

50. In which of the following circuits will the lamp light up?

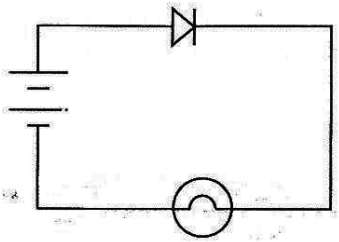
(A)



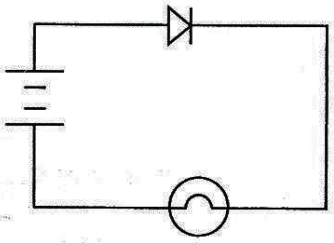
(C)



(B)



(D)



51. Which of the following pairs of statements is true for BOTH iron and steel?

	Iron	**Steel**
(A)	easily magnetised	does not retain its magnetism
(B)	not easily magnetised	retains its magnetism well
(C)	easily magnetised	retains its magnetism well
(D)	not easily magnetised	does not retain its magnetism

52. Which device allows one circuit to switch another circuit on or off without any direct contact between them?

(A) Magnetic relay
(B) Electromagnet
(C) Generator
(D) Motor

53. Which of the following would be possible symbols for an isotope of the nuclide ${}^{A}_{Z}X$?

I. ${}^{A-2}_{Z}X$

II. ${}^{A}_{Z-2}X$

III. ${}^{A+2}_{Z}X$

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

54. ${}^{14}_{6}C$ (Carbon 14) decays in accordance with the equation ${}^{14}_{6}C \rightarrow {}^{14}_{7}N + X$. The emission X is

(A) a proton
(B) a gamma ray
(C) a beta particle
(D) an alpha particle

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

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

Item **56** refers to the following truth table with inputs A and B and output C.

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

56. Which of the following logic gates does the truth table above describe?

(A) NAND
(B) NOR
(C) AND
(D) OR

57. In the scattering experiment conducted by Geiger and Marsden, some of the alpha particles were deflected. The explanation for this phenomenon is that

(A) electrons have a small mass
(B) electrons have a small charge
(C) the metal foil was only a few atoms thick
(D) the nuclear charge and mass are concentrated in a small volume

Item **58** refers to the following diagram of a portion of the periodic table.

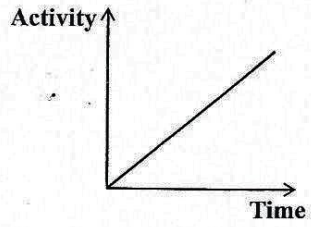
					He
E	**C**	**N**	**O**	**9 F**	**Ne**

58. In the diagram above, Element F has 9 protons. How many protons does Element E have?

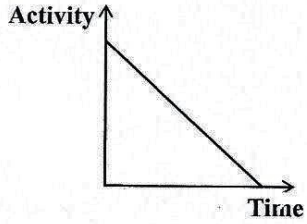
(A) 5
(B) 6
(C) 8
(D) 12

59. Which of the following graphs shows how the activity of a radioactive source varies with time?

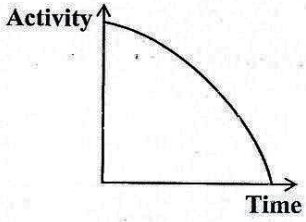
(A)



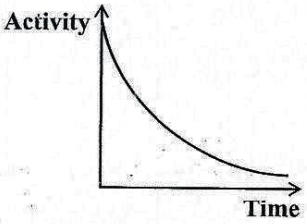
(B)



(C)



(D)



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.