AFFIX SEAL HERE

CANDIDATE – PLEASE NOTE!

You must sign below and return this booklet with the Answer Sheet. Failure to do so may result in disqualification.

Signature

FORM TP 2010097

TEST CODE **01238010**

MAY/JUNE 2010

CARIBBEAN EXAMINATIONS COUNCIL

SECONDARY EDUCATION CERTIFICATE EXAMINATION

PHYSICS

Paper 01 – General Proficiency

75 minutes

03 JUNE 2010 (a.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 60 items. You will have 75 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

   ● (B) (C) (D)

   The best answer to this item is "metre" so answer space (A) has been shaded.
5. If you want to change your answer, be sure to 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 the omitted item later. Your score will be the total number of correct answers.
7. Figures are not necessarily drawn to scale.
8. You may do any rough work in this booklet.
9. The use of non-programmable calculators is allowed.

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

AFFIX SEAL HERE

0097

Copyright © 2009 Caribbean Examinations Council ®.

1. Which of the following groups of quantities contains one which is NOT an S.I. base quantity?

(A) Mass, length, time
(B) Current, temperature, length
(C) Volume, temperature, time
(D) Time, mass, temperature

2. 3.1415926 expressed to TWO significant figures is

(A) 3.1
(B) 3.14
(C) 3.2
(D) 31

3. The symbol for the unit of the moment of a force is

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

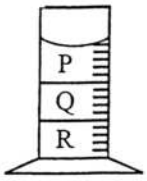
4. The unit of electrical resistance is expressed as

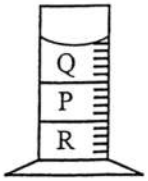
(A) 1 Ω = 1 $V.A^{-1}$
(B) 1 Ω = 1 A.V
(C) 1 Ω = 1 $A.V^{-1}$
(D) 1 Ω = 1 $W.A^{-1}$

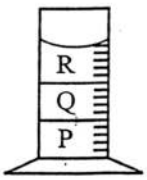
5. The time period of a simple pendulum oscillating with a small amplitude depends on the

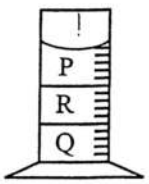
(A) mass of the pendulum bob
(B) amplitude of the oscillation
(C) length of the pendulum
(D) force with which the pendulum is set into motion

6. Three immiscible liquids P, Q and R have different densities. Q is denser than P but less dense than R. Which of the following diagrams shows how the liquids settle in the measuring cylinder?

(A) 

(B) 

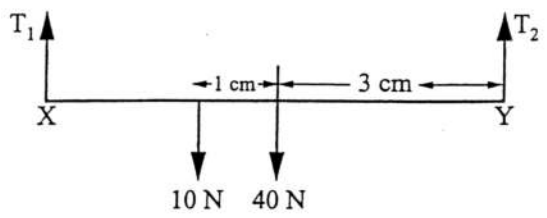
(C) 

(D) 

7. A bus with luggage loaded on top is more likely to tip over when rounding a corner than the same bus without the luggage. The reason for this is that the luggage

(A) increases the weight of the bus
(B) raises the centre of gravity of the bus
(C) lowers the centre of gravity of the bus
(D) increases the momentum of the bus

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



8. A uniform rod XY of weight 40 N is held in equilibrium, horizontally, as shown in the diagram above. Which of the following is true?

(A) $T_1 < T_2$

(B) $T_1 \leq T_2$

(C) $T_1 = T_2$

(D) $T_1 > T_2$

9. Which of the following is used to calculate the efficiency of a machine?

(A) $\frac{\text{Load x Distance moved by Effort}}{\text{Effort x Distance moved by Load}} \times \frac{100\%}{1}$

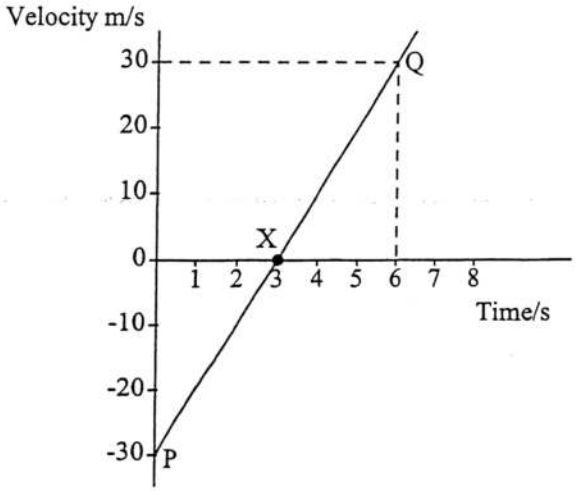
(B) $\frac{\text{Load x Distance moved by Load}}{\text{Effort x Distance moved by Effort}} \times \frac{100\%}{1}$

(C) $\frac{\text{Effort x Distance moved by Effort}}{\text{Load x Distance moved by Load}} \times \frac{100\%}{1}$

(D) $\frac{\text{Effort x Distance moved by Load}}{\text{Load x Distance moved by Effort}} \times \frac{100\%}{1}$

Items **10 – 11** refer to the following velocity-time graph which shows a ball being thrown vertically upwards from the ground.

Downward motion is assumed to be positive.



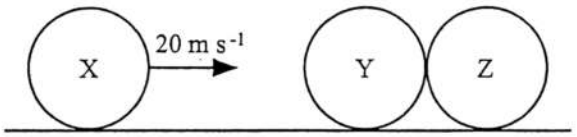
10. The point, X, on the graph shows when the ball is

(A) at its highest point above the ground
(B) at rest on the ground
(C) just about to be thrown upwards
(D) on its way halfway downwards

11. The gradient of the line, PQ, represents the

(A) distance the ball has covered
(B) displacement of the ball from the ground
(C) acceleration of the ball as it moves
(D) velocity of the ball for its entire flight

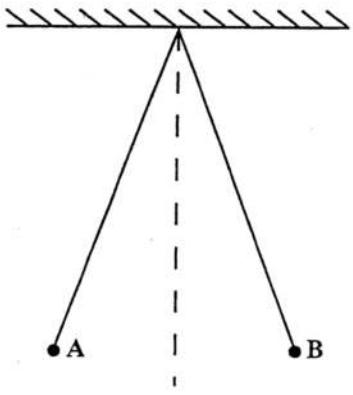
Item **12** refers to the following diagram



12. X, Y and Z are three billiard balls of equal mass whose centres lie in a straight line. Y and Z are touching each other and are stationary. X, travelling with a velocity of 20 m s^{-1}, impinges on Y. Assuming that the spheres are perfectly elastic, the resultant motion after impact is

(A) X, Y and Z all move on together, each with a velocity of 10 m s^{-1}
(B) X and Y remain stationary while Z moves on with a velocity of 20 m s^{-1}
(C) X, Y and Z remain stationary
(D) X remains stationary while Y and Z move on together each with a velocity of 10 m s^{-1}

Item **13** refers to the following diagram which shows two positively charged spheres A and B suspended by insulating threads.



13. If the spheres come to rest as shown in the diagram, the force keeping them apart is the

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

14. Which of the following tools is/are designed to take advantage of a large moment provided by a relatively small force?

I. Claw hammer
II. Crowbar
III. Pair of tweezers
IV. Pair of wire cutters

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

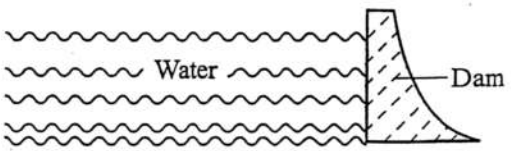
15. Which of the following is a unit of work?

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

16. When a car is moving at a constant speed the energy changes occurring are

(A) chemical energy to kinetic energy
(B) chemical energy to potential energy
(C) kinetic energy to potential energy
(D) chemical energy to nuclear energy

Item **17** refers to the following diagram which shows a dam.



17. The pressure on the dam at the bottom of the reservoir depends on the

(A) depth of the water
(B) volume of water held by the dam
(C) mass of water held back by the dam
(D) length of the reservoir

18. A piece of string is tied onto a small stone and the stone is then suspended, totally immersed, in water. The tension in the string will be

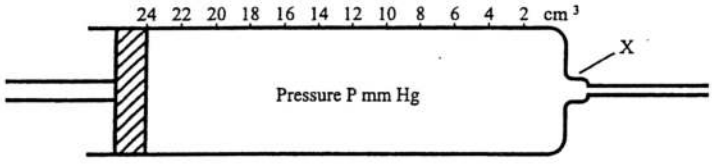
(A) zero
(B) equal to the weight of the stone
(C) less than the weight of the stone
(D) more than the weight of the stone

19. A solid object when placed in a beaker of water just sinks to the bottom. Which of the following should be done to make the object float?

I. Cutting off part of the object
II. Dissolving a lot of salt in the water
III. Carrying the beaker up to the top of a high mountain

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

Item 20 refers to the following diagram.



20. 24 cm^3 of air at a pressure P mm Hg are trapped in the syringe which is blocked at X. The piston is forced to the 8 cm^3 mark. The new pressure in terms of P is

(Assume constant temperature)

(A) P/3
(B) 3 P
(C) 8 P
(D) 24 P

21. In the pressure law which of the following would be 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

22. Which of the following are characteristic features of a clinical thermometer?

I. Narrow constriction in the tube just above the bulb
II. Limited range of temperatures
III. Large bore to make the mercury more visible

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

23. Which of the following are reasons why a hot liquid, placed in a double-walled vacuum flask, retains its heat for a long time?

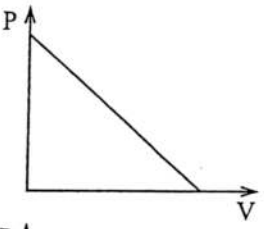
I. Evacuated space between the double walls reduces the loss of heat by conduction.
II. Silver inner walls reduce the loss of heat by radiation.
III. The silvered outer wall helps to absorb heat from the surroundings.

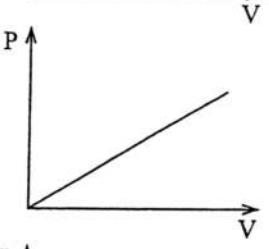
(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

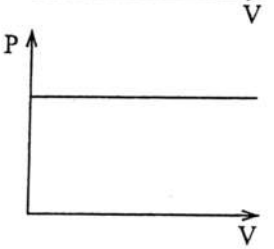
24. Which of the following is longitudinal in nature?

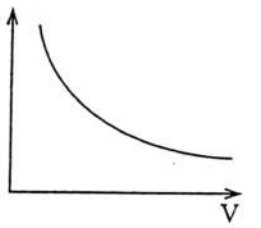
(A) Infrared rays
(B) Light rays
(C) Sound waves
(D) Water waves

25. Which of the following graphs illustrates the variation of pressure (P) with volume (V) for a gas obeying Boyle's Law?

(A)


(B)


(C)


(D)


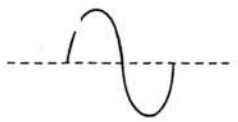
26. A gas is much easier to compress than a solid or liquid because the gas molecules

(A) are very numerous
(B) are arranged randomly
(C) are moving very rapidly
(D) have no forces between them

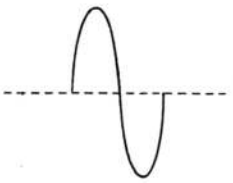
27. A fixed mass of gas at constant temperature is compressed. The molecules of the gas will

(A) hit the sides of the container more often
(B) have more kinetic energy
(C) move more slowly
(D) have more momentum

28. Which of the following waves has the GREATEST amplitude?

(A)


(B)


(C)


(D)


29. 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) $f = \frac{\upsilon}{\lambda}$

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

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

30. An electric current in a metal consists of a flow of

(A) neutrons
(B) protons
(C) electrons
(D) ions

31. The spreading of a wave into the region behind an obstruction is called

(A) diffraction
(B) refraction
(C) superposition
(D) interference

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

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

33. In domestic installation systems, which of the following 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

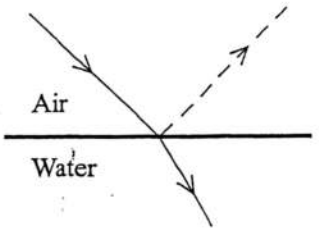
34. Which of the following are the same for all electromagnetic waves travelling through a vacuum?

I. Speed
II. Wavelength
III. Frequency

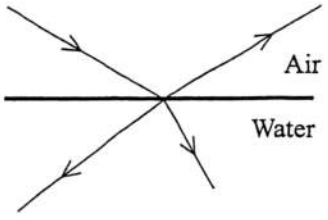
(A) I only
(B) I and II only
(C) II and III only
(D) I, II and III

35. Which of the following diagrams does NOT illustrate what happens when a ray of light meets an air-water boundary?

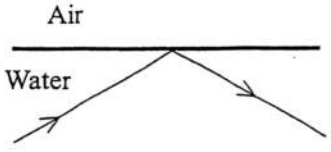
(A)



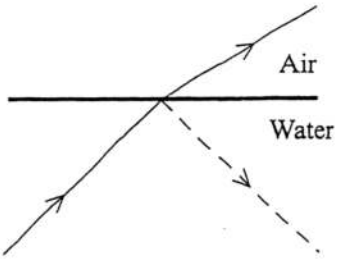
(B)



(C)



(D)



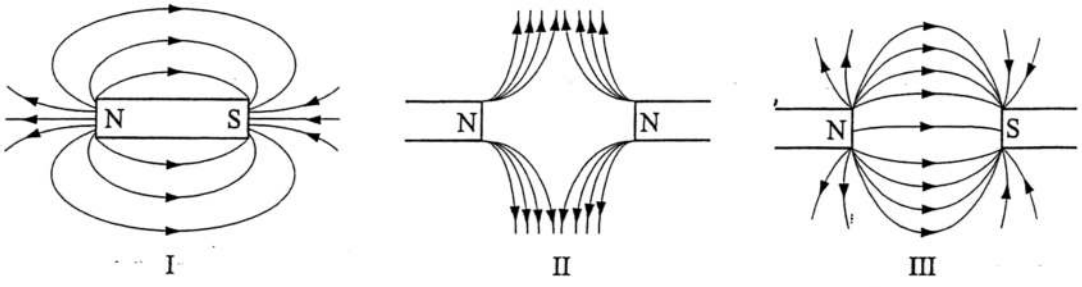
36. Which of the following would be the unit(s) of the heat capacity of an object?

(A) J
(B) $J\ kg^{-1}$
(C) $J\ K^{-1}$
(D) $J\ kg^{-1}\ K^{-1}$

37. Which of the following is NOT one of the ways in which the strength of the magnetic field near a solenoid (long coil) carrying a current can be increased?

(A) Increasing the resistance of the coil
(B) Increasing the current in the coil
(C) Increasing the number of turns per unit length of the coil
(D) Placing a soft iron core inside the coil

Item **38** refers to the diagrams below which show the magnetic field lines plotted by a student.



I II III

38. In which of the following diagrams are the magnetic field lines plotted correctly?

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

---

39. Which of the following is equal to 1 kW h?

(A) 3.6 kJ
(B) 36 kJ
(C) 360 kJ
(D) 3 600 kJ

40. Each prism or mirror of a periscope turns light rays through an angle of

(A) 45^0
(B) 90^0
(C) 180^0
(D) 360^0

41. Which of the following relationships between the electrical quantities is correct?

(A) $V = PI$

(B) $R = VI$

(C) $Q = \frac{E}{V}$

(D) $E = VI$

42. The speed of light is highest when it passes through

(A) water
(B) air
(C) glass
(D) a vacuum

43. Total internal reflection in a medium occurs only when the angle of incidence

(A) equals 90^0
(B) equals the angle of refraction
(C) is greater than the critical angle
(D) is less than the critical angle

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) $\sin c$

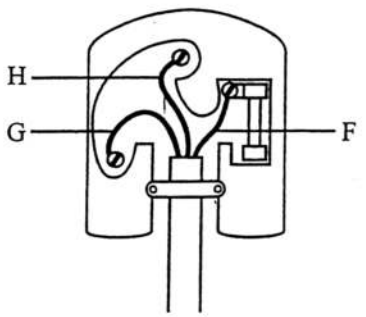
45. Magnetic induction occurs when

(A) a N pole attracts a S pole
(B) iron nails near a magnet become magnetised
(C) a magnet is suspended and points in the NS direction
(D) an electroscope is charged

46. Which of the following characteristics concerning ammeters is correct?

	Resistance	**Circuit connection**
(A)	Low	in series
(B)	Low	in parallel
(C)	High	in parallel
(D)	High	in series

Item 47 refers to the following diagram.



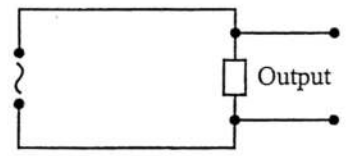
47. The diagram above shows the inside of a three-pin electric plug. The wires are labelled, F, G and H. Which of the following is true?

I. H is the earth wire with insulation colour, green/yellow.
II. F is the neutral wire with insulation colour, blue.
III. G is the live wire with insulation colour, brown.

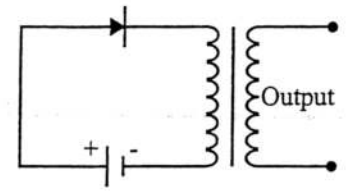
(A) I only
(B) I and II only
(C) II and III only
(D) I, II and III

48. Which of the following circuits can be used for half-wave rectification?

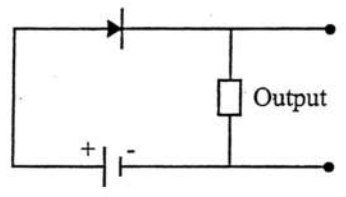
(A)



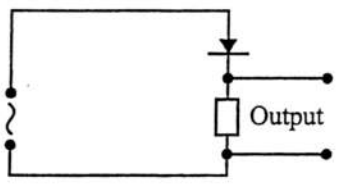
(B)



(C)

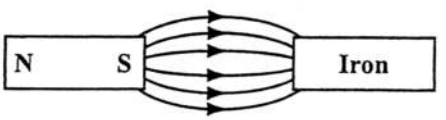


(D)



49. Which of the following shows the magnetic field between a bar magnet and a piece of iron?

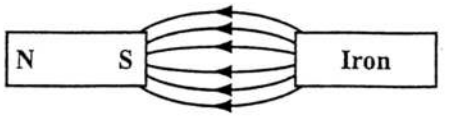
(A)



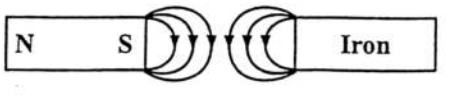
(B)



(C)



(D)



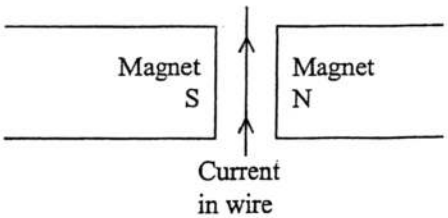
50. Which of the following is the MOST suitable material for the core of an electromagnet?

(A) Copper
(B) Steel
(C) Carbon
(D) Soft iron

51. When a wire is moved across a magnetic field, an e.m.f. is induced because the

(A) magnetic fields interact
(B) magnetic flux is cut by the wire
(C) electric fields interact
(D) lines of force behave like stretched elastic

Item 52 refers to the following diagram.



52. The wire in the diagram will move

(A) towards N
(B) towards S
(C) into the paper
(D) out of the paper

53. The nucleus of an atom contains protons and neutrons of

(A) approximately equal mass
(B) greatly differing masses
(C) opposite charge
(D) the same charge

54. Isotopes of the an element have

(A) different atomic numbers
(B) same mass numbers
(C) atoms with the same number of protons
(D) atoms with different numbers of electrons

55. Which of the following are definitions for the term 'half-life' of a radioactive nuclide?

I. The time taken for the activity of any give sample to fall to half its original value.
II. The time taken for half the nuclei present in any given sample to decay.
III. Half the average number of disintegrations per second.

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

56. Radioactivity takes place in an atom as a result of

(A) nuclear instability
(B) a chemical reaction
(C) exposure to excess heat
(D) excess stress on the atom

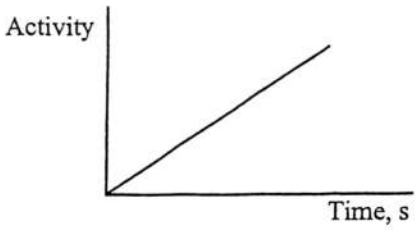
57. Which of the following statements about radioactive decay are correct?

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.

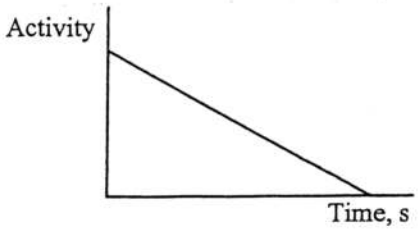
(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

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

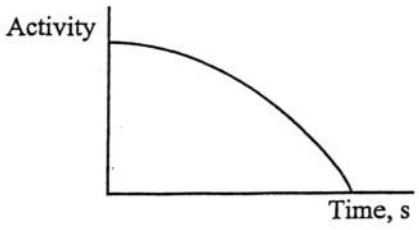
(A)



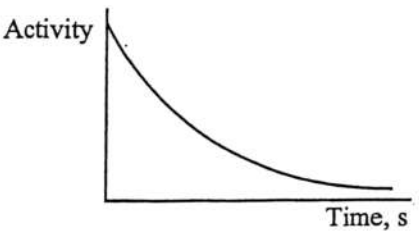
(B)



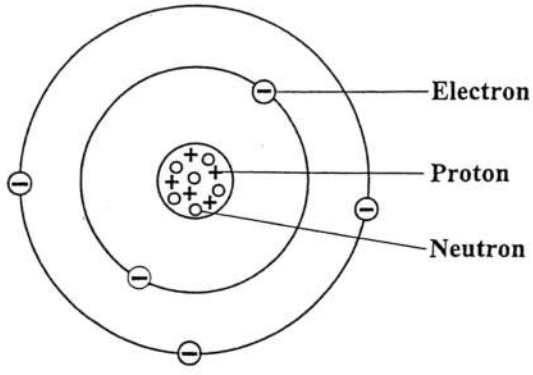
(C)



(D)



59. The diagram below shows the shell model of an atom.

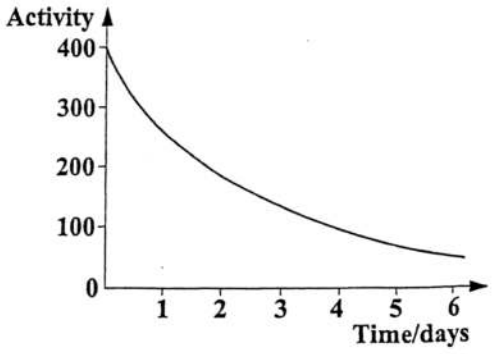


Which of the following statements is/are correct?

I. The mass (nucleon) number is 11.
II. The atomic (proton) number is 5.
III. The atom shown in the diagram is positively charged.

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

Item 60 refers to the following information.
The activity of a radioactive substance was measured at suitable intervals over a period of days and its radioactive decay curve plotted as shown below.



60. The half-life of the radioactive substance is approximately

(A) 1 day
(B) 2 days
(C) 3 days
(D) 4 days

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