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 2019099

MAY/JUNE 2019

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN SECONDARY EDUCATION CERTIFICATE® EXAMINATION

PHYSICS

Paper 01 – General Proficiency

1 hour 15 minutes

05 JUNE 2019 (p.m.)

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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. 3.1415926 expressed as TWO significant figures is

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

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

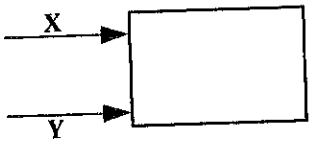
(A) metre rule
(B) tape measure
(C) length of string
(D) pair of vernier calipers

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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

Item 4 refers to the following diagram which shows two forces, X and Y, applied onto an object.



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4. What should be the magnitude and direction of a third force which will cause the object to remain stationary?

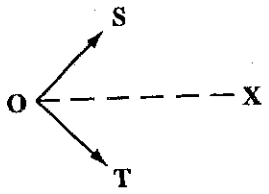
(A) $X - Y$ to the left
(B) $X + Y$ to the left
(C) $X - Y$ to the right
(D) $X + Y$ to the right

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

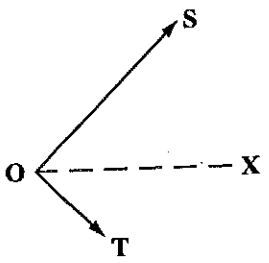
(A) 0.00895 m
(B) 0.0895 m
(C) 0.895 m
(D) 8.95 m

6. The diagrams below, NOT **drawn to scale**, represent two forces, S and T, acting at O. In which of the following is the resultant in the direction OX?

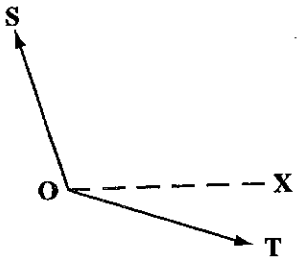
(A)



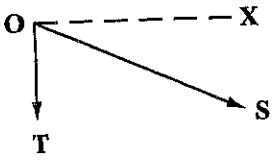
(B)



(C)



(D)



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. Which of the following rates will determine the power of a machine?

I. Doing work
II. Converting energy
III. Changing temperature

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

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

(A) Sunroof
(B) Long front
(C) Narrow wheelbase
(D) Low centre of gravity

10. 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

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

$P = pgh.$

Which of the following sets of units will result in the SI unit of pressure?

	p	**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

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

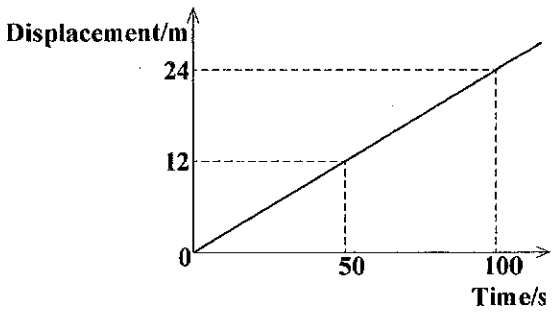
13. Which of the following quantities has the same value as 6 μC?

(A) 6×10^{6} C
(B) 6×10^{3} C
(C) 6×10^{-3} C
(D) 6×10^{-6} C

14. Which of the following is an SI base unit?

(A) Volt
(B) Ohm
(C) Ampere
(D) Coulomb

Item 15 refers to the following graph which shows how the displacement of a runner from a starting line varies with time.



15. From the graph it can be deducted that the runner is

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

16. 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

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

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

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

20. A metal of mass m requires energy, E, to raise its temperature from T_1 to T_2. The specific heat capacity of the metal will be given by

(A) $\frac{E}{mT_2}$

(B) $\frac{Em}{(T_1 - T_2)}$

(C) $\frac{E}{m(T_1 - T_2)}$

(D) $\frac{E}{m(T_2 - T_1)}$

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21. The specific latent heat of vaporization of water is 2.26×10^6 J kg^{-1}. When 0.01 kg of water is converted into steam it

(A) absorbs 2.26×10^4 J
(B) gives out 2.26×10^4 J
(C) absorbs 2.26×10^8 J
(D) gives out 2.26×10^8 J

22. A gas occupies 2 m^3 at 27 °C 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

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

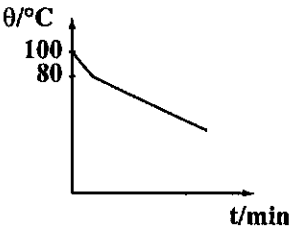
I. Radiation can only take place in a material medium.
II. A good absorber is also a good emitter of radiation.
III. Dark dull surfaces are better emitters than shiny ones.

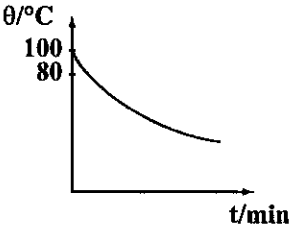
(A) III only
(B) I and II only
(C) I and III only
(D) II and III only

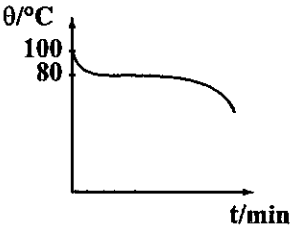
24. Which of the following quantities remain unchanged with an INCREASE in temperature?

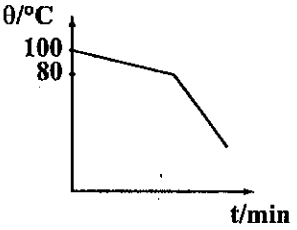
(A) Mass
(B) Density
(C) Volume
(D) Relative density

25. Some molten naphthalene at 100 °C is allowed to cool to room temperature. If naphthalene has a melting point of 80 °C, which of the following graphs BEST represents the cooling curve?

(A)


(B)


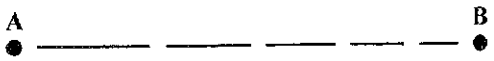
(C)


(D)


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

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

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

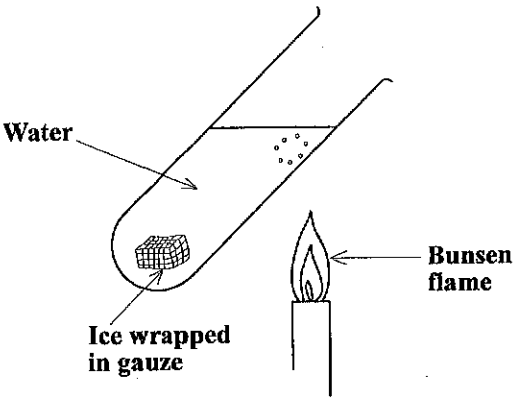
28. In which of the following is conduction the MAIN method of energy transfer?

(A) Food heated in a microwave oven
(B) Energy transferred from the sun to earth
(C) Food being cooked on a barbecue
(D) Food being cooked in a pot on an electric stove

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 which shows water boiling at the top of a glass test tube while a piece of ice remains unmelted at the bottom.



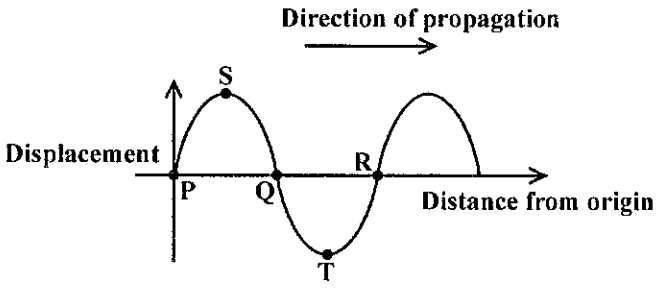
30. Which of the following statements is the reason for this occurrence?

(A) Water is a poor conductor of heat.
(B) Gauze is a poor conductor of heat.
(C) Water is a good conductor of heat.
(D) Glass is a good conductor of heat.

31. Whenever there is complete destructive interference between two coherent wave trains, the waves must be

(A) in phase
(B) out of phase by half of a wavelength
(C) out of phase by one wavelength
(D) out of phase by a quarter of a wavelength

Item 32 refers to the following diagram of a wave.



32. Which of the following statements about the wave shown in the diagram 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 and II only
(B) I and III only
(C) II and III only
(D) I, II and III

33. An echo is quieter than the original sound that produced it. This shows that, compared to the original sound, the echo has a

(A) smaller amplitude
(B) shorter wavelength
(C) lower frequency
(D) slower speed

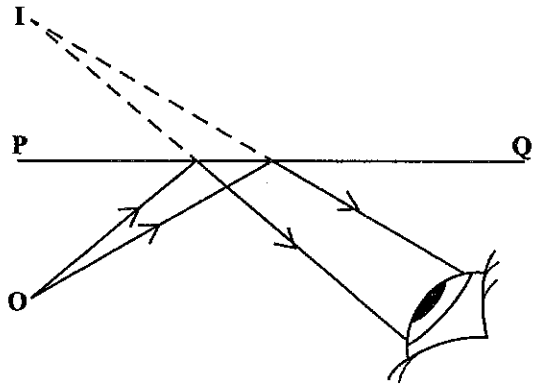
34. Which of the following can produce a diminished virtual image of a real object?

(A) A converging lens
(B) A diverging lens
(C) A plane mirror
(D) A glass block

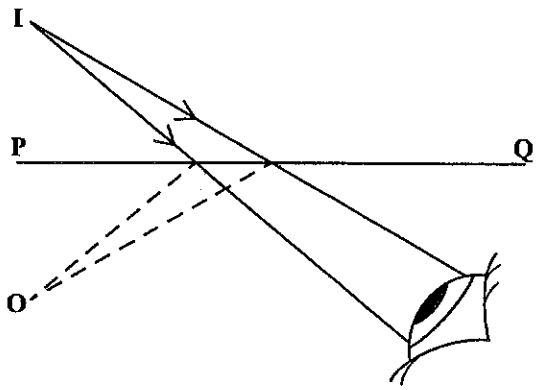
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35. An object O is viewed in a plane mirror PQ. Which of the following diagrams correctly shows the formation of the image?

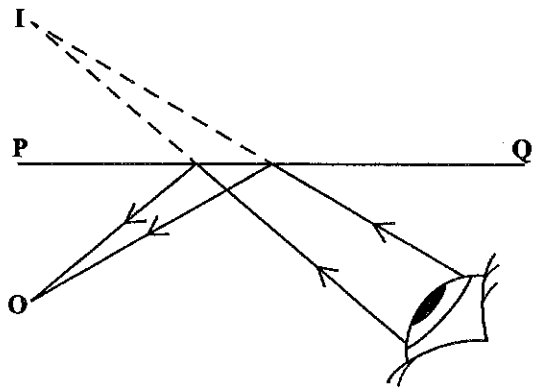
(A)



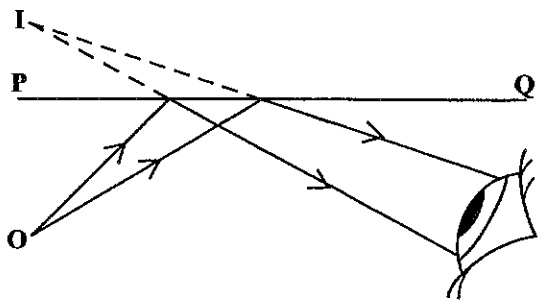
(C)



(B)

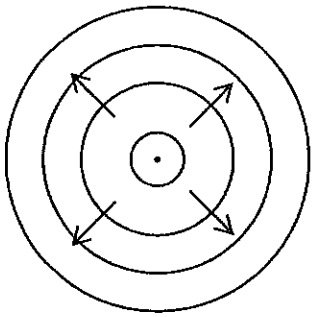


(D)

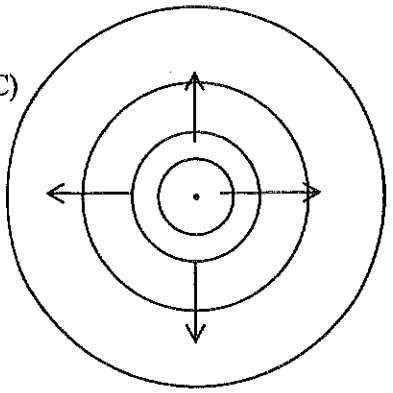


36. Which of the following diagrams BEST represents the wave generated in a ripple tank by a small spherical dipper vibrating at a constant frequency?

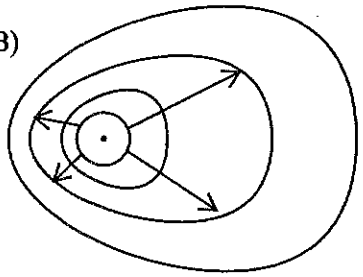
(A)



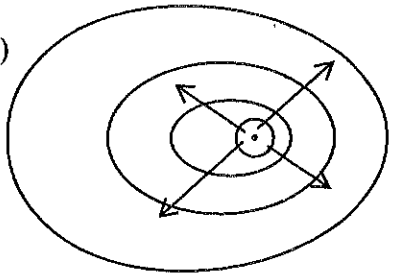
(C)



(B)



(D)



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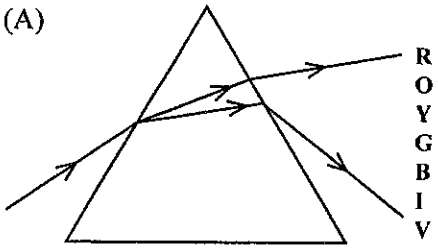
37. Which of the following statements about waves is true?

(A) Only transverse waves undergo reflection.
(B) Diffraction can only take place with light waves.
(C) All waves undergo reflection, refraction and diffraction.
(D) Longitudinal waves do not undergo refraction, but may be reflected.

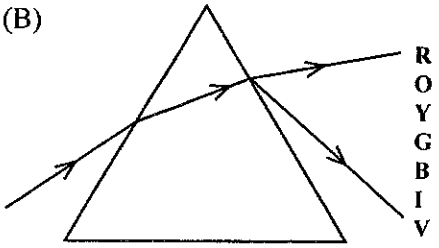
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38. A ray of white light enters a transparent glass prism. In which of the following diagrams is the dispersion of light correctly illustrated?

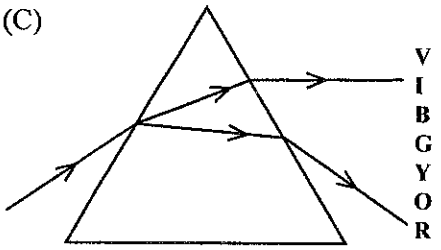
(A)



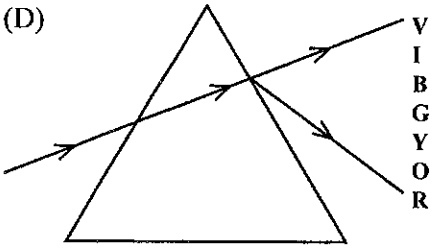
(B)



(C)

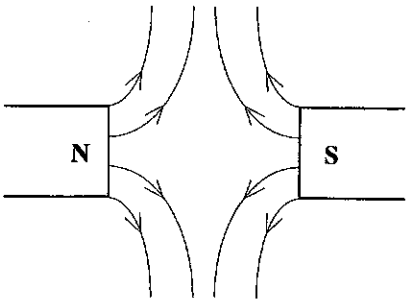


(D)

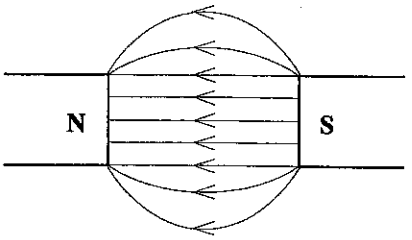


39. Which of the following diagrams represents the magnetic field which exists between two opposite magnetic poles?

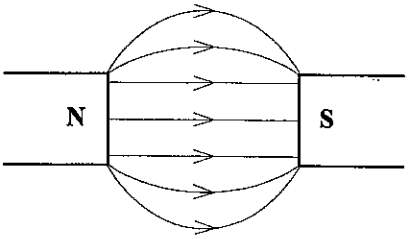
(A)



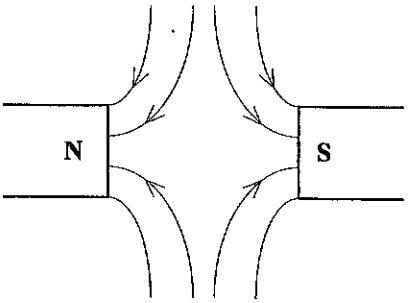
(B)



(C)



(D)

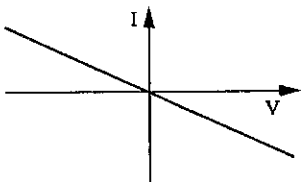


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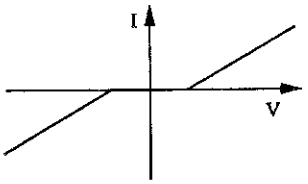
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40. Which of the following diagrams is a graphical representation of current versus potential difference for a metallic conductor at a constant temperature?

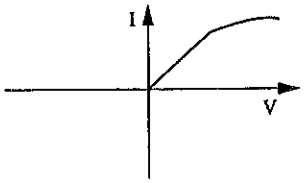
(A)



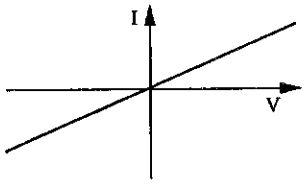
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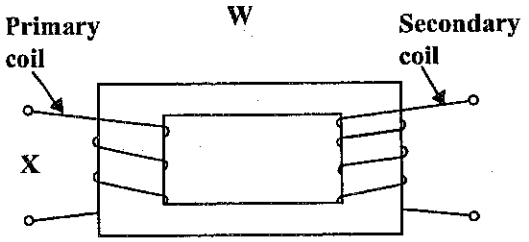
(C)



(D)



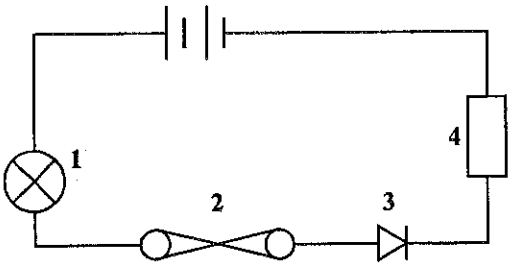
Item 41 refers to the following diagram.



41. Appropriate labels for W and X are

	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.



42. Which of the following options shows the correct match of the component name and its number?

	Diode	Lamp	Resistor	Fuse
(A)	3	1	4	2
(B)	4	3	1	2
(C)	1	3	4	2
(D)	2	4	3	1

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

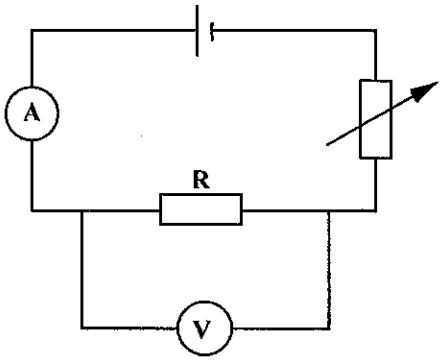
Item 44 refers to the following truth table with inputs A and B and output C.

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

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

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

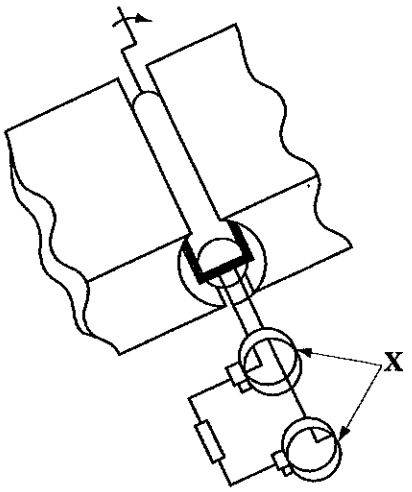
Item 45 refers to the following circuit where the ammeter reads 0.4 A and the voltmeter reads 0.6 V.



45. What is the resistance of R?

(A) 15 Ω
(B) 1.5 Ω
(C) 0.67 Ω
(D) 0.24 Ω

Item 46 refers to the following diagram of a simple a.c. generator.



46. The parts labelled X in the diagram are known as the

(A) commutators
(B) armatures
(C) slip rings
(D) coils

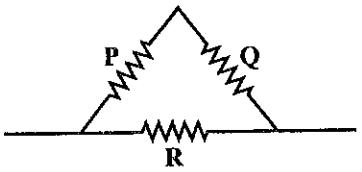
212
A005

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

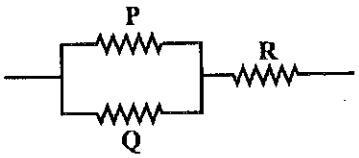
(A) It can be changed into direct current by a transformer.
(B) It can be rectified by using a semiconductor diode.
(C) It can be used to recharge a battery.
(D) It is used to transmit electrical energy because of its high frequency.

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

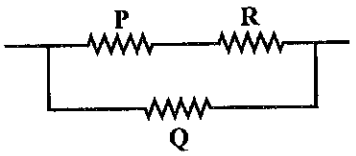
(A)



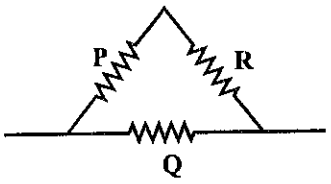
(B)



(C)

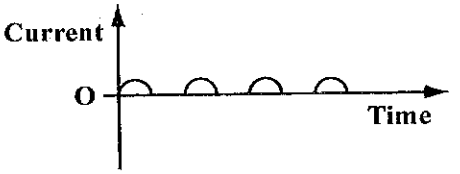


(D)

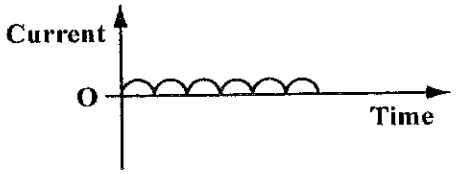


49. Which of the following graphs illustrates an ALTERNATING current?

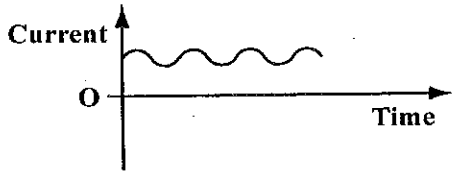
(A)



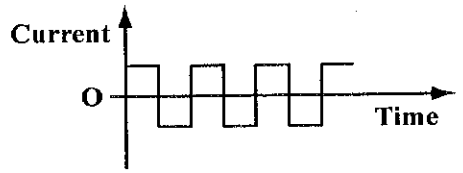
(B)



(C)



(D)



50. Magnetic induction occurs when

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

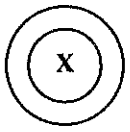
212

A005

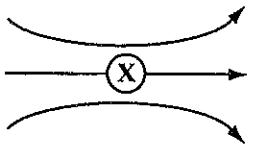
51. Which of the following pairs of statements is true for BOTH iron and steel?

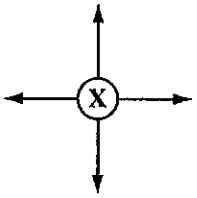
	Iron	Steel
(A)	Easily magnetized	Does not retain its magnetism
(B)	Not easily magnetized	Retains its magnetism well
(C)	Easily magnetized	Retains its magnetism well
(D)	Not easily magnetized	Does not retain its magnetism

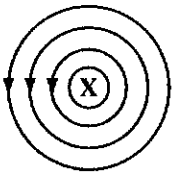
Item 52 refers to the followig diagram which represents a straight wire carrying a current into the plane of the paper.

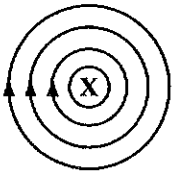


52. Which of the following diagrams BEST represents the magnetic field around the wire?

(A)


(B)


(C)


(D)


53. Which of the following are 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. In the equation $\Delta E = \Delta mc^2$

(A) c = speed of light, Δm = mass of atom
(B) c = speed of light, Δm = mass lost
(C) c = specific heat capacity of substance, Δm = mass lost
(D) c = specific heat capacity of substance, Δm = mass of substance

56. The number of neutrons present in the nucleus of the nuclide $^{222}_{86}$Rn is

(A) 308
(B) 222
(C) 136
(D) 86

57. Which of the following describes two properties of an α-particle?

(A) No charge, very penetrating
(B) Positive charge, very penetrating
(C) Negative charge, not very penetrating
(D) Positive charge, not very penetrating

58. Sodium–24 decays into Magnesium–24 with the emission of a ß-particle and can be represented by the following equation.

$^{24}_{11}Na \rightarrow {}^{24}_{12}Mg + \square$

Which of the following options should be placed in the box to complete the equation?

(A) $^{0}_{1}e$
(B) $^{0}_{-1}e$
(C) $^{4}_{1}He$
(D) $^{0}_{-1}He$

59. Which of the following scientists discovered the relationship $E = mc^2$?

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

60. A radioactive isotope has a half-life of 20 days. How many days will it take for a given sample to have its activity reduced to $\frac{1}{8}$ of its initial value?

(A) 1.2 days
(B) 60 days
(C) 80 days
(D) 320 days

END OF TEST

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