NDA-CDS 2 2024

GS

LIVE

PHYSICS

REVISION

CLASS 6

NAVJYOTI SIR

SSBCrack EXAMS

12 August 2024 Live Classes Schedule

8:00AM	12 AUGUST 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	12 AUGUST 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:00AM	OVERVIEW OF PIQ & PI	ANURADHA MA'AM

NDA 2 2024 LIVE CLASSES

11:00AM	GK - POLITY REVISION - CLASS 3	RUBY MA'AM
12:00PM	PHYSICS REVISION - CLASS 6	NAVJYOTI SIR
1:00PM	MATHS REVISION - CLASS 6	NAVJYOTI SIR
2:00PM	BIOLOGY REVISION - CLASS 6	SHIVANGI MA'AM
5:30PM	ENGLISH - MATCHING LIST - CLASS 2	ANURADHA MA'AM

CDS 2 2024 LIVE CLASSES

11:00AM	GK - POLITY REVISION - CLASS 2	RUBY MA'AM
12:00PM	PHYSICS REVISION - CLASS 5	NAVJYOTI SIR
2:00PM	BIOLOGY REVISION - CLASS 5	SHIVANGI MA'AM
3:00PM	MATHS REVISION - CLASS 5	NAVJYOTI SIR
5:30PM	ENGLISH - MATCHING LIST - CLASS 2	ANURADHA MA'AM

TODAY's REVISION TOPICS :

- Electricity
- Magnetism

Which one of the following is primarily responsible for conduction of current in a metal ?

(a) Bound electrons

(b) Free electrons

(c) Both bound and free electrons

(d) Ions

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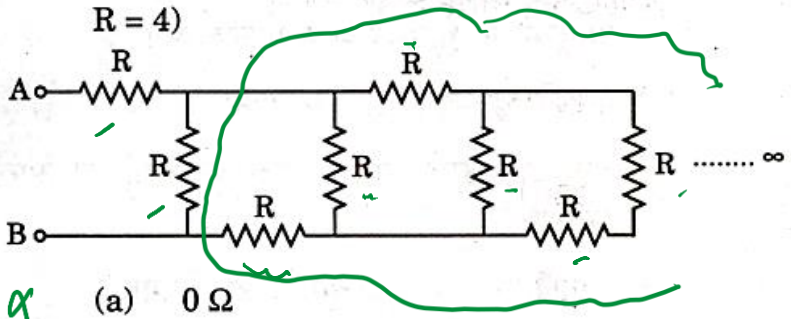
ANS : B

An infinite combination of resistors, having resistance R = 4 Ω, is given belo. What is the net resistance between the points A and B ? (Each resistance is of equal value, R = 4)

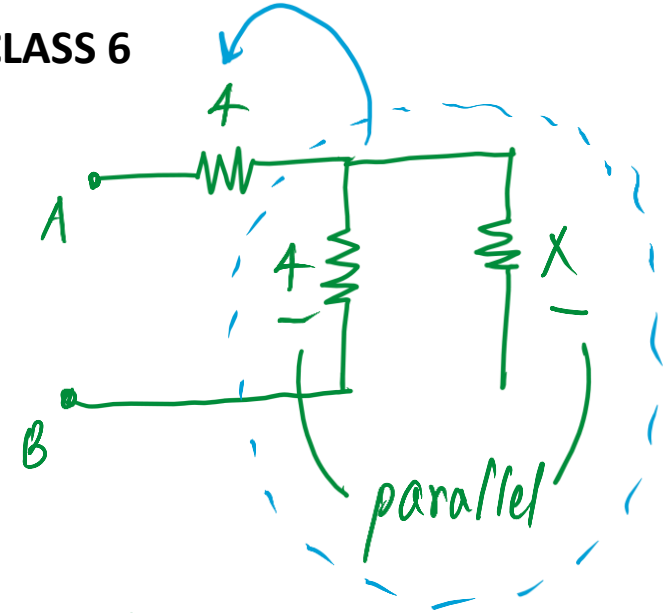


(a) 0 Ω

(b) $2+2\sqrt{5}$ Ω

(c) $2+\sqrt{5}$ Ω

(d) ∞ Ω



$$\frac{4X}{4+X} + 4 = X$$

$$4X + 16 + 4X = 4X + X^2$$

$$X^2 - 4X - 16 = 0$$

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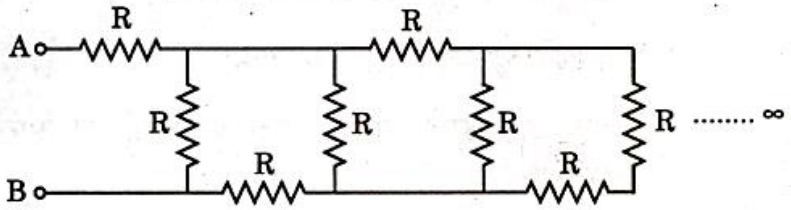


(a) 0 Ω

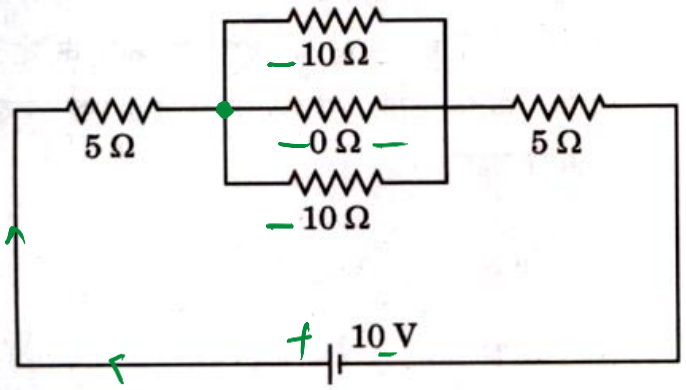
(b) $2+2\sqrt{5}$ Ω

(c) $2+\sqrt{5}$ Ω

(d) ∞ Ω

Answer: (C)

Consider the following electric circuit :



The current in the above electric circuit is :

(a) 1 A

(b) (10/15) A

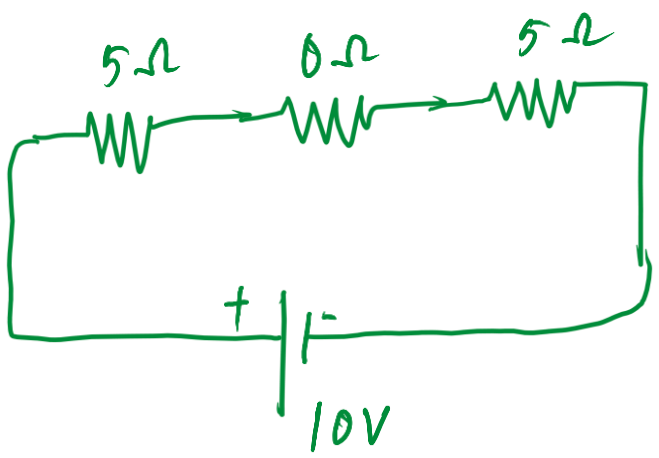
(c) 2 A

(d) 1·5 A

current will always go through the no resistance - path (0 Ω)

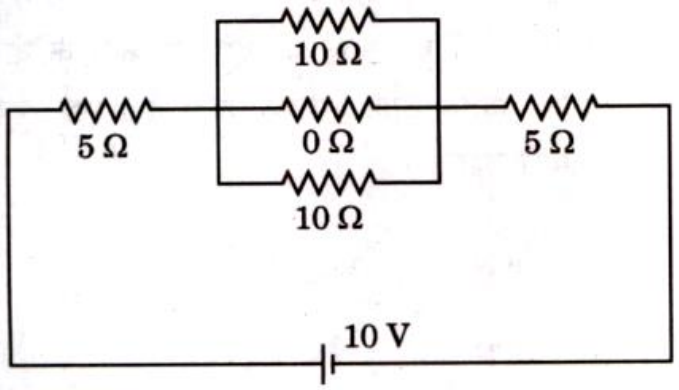
Total equivalent resistance = 5 Ω + 5 Ω

= 10 Ω



current = $\frac{\text{voltage / potential diff.}}{\text{equivalent resistance}} = \frac{10V}{10\Omega} = 1A$

Consider the following electric circuit :



The current in the above electric circuit is :

(a) 1 A

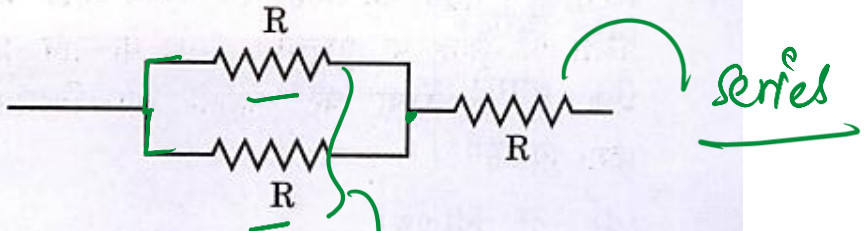
(b) (10/15) A

(c) 2 A

(d) 1·5 A

Answer: (A)

1. What is the total resistance in the following circuit element ?



(a) R/2

(b) 3R

(c) 3R/2

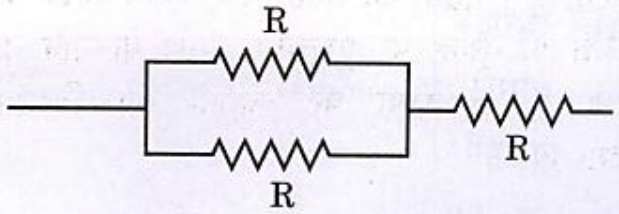
(d) 2R/3

series

parallel

$\frac{R}{2} + R = \frac{3R}{2}$

1. What is the total resistance in the following circuit element ?



(a) R/2

(b) 3R

(c) 3R/2

(d) 2R/3

Answer: (C)

The cost of energy to operate an industrial refrigerator that consumes 5 kW power working 10 hours per day for 30 days will be
(Given that the charge per kW.h of energy = ₹ 4)

(a) ₹ 600

(b) ₹ 6,000

(c) ₹ 1,200

(d) ₹ 1,500

Power = 5 kW

Time = 10 x 30 = 300 hrs.

Energy (kWh) = 5 x 300 = 1500 kWh

1500 x 4 = ₹ 6000

The cost of energy to operate an industrial refrigerator that consumes 5 kW power working 10 hours per day for 30 days will be
(Given that the charge per kW.h of energy = ₹ 4)

(a) ₹ 600

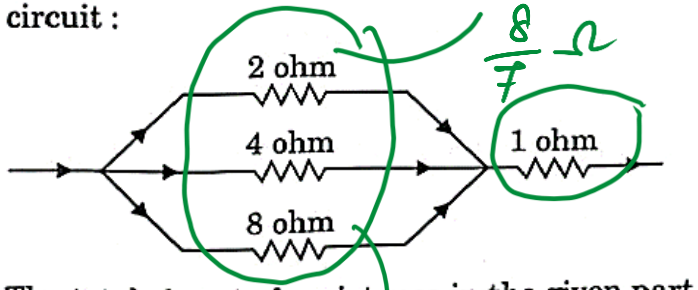
(b) ₹ 6,000

(c) ₹ 1,200

(d) ₹ 1,500

Answer: (B)

Consider the following part of an electric circuit :



The total electrical resistance in the given part of the electric circuit is

(a) $\frac{15}{8}$ ohm

(b) $\frac{15}{7}$ ohm

(c) 15 ohm

(d) $\frac{17}{3}$ ohm

$\frac{8}{7}\Omega$

parallel

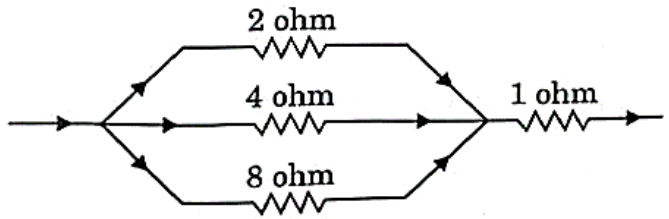
$\frac{1}{R} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{4+2+1}{8} = \frac{7}{8}$

$R = \frac{8}{7}\Omega$

$\frac{8}{7}\Omega + 1\Omega = \frac{15}{7}\Omega$

(series)

Consider the following part of an electric circuit :



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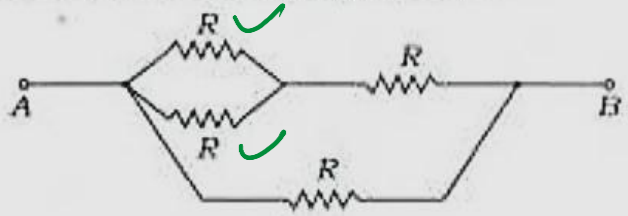


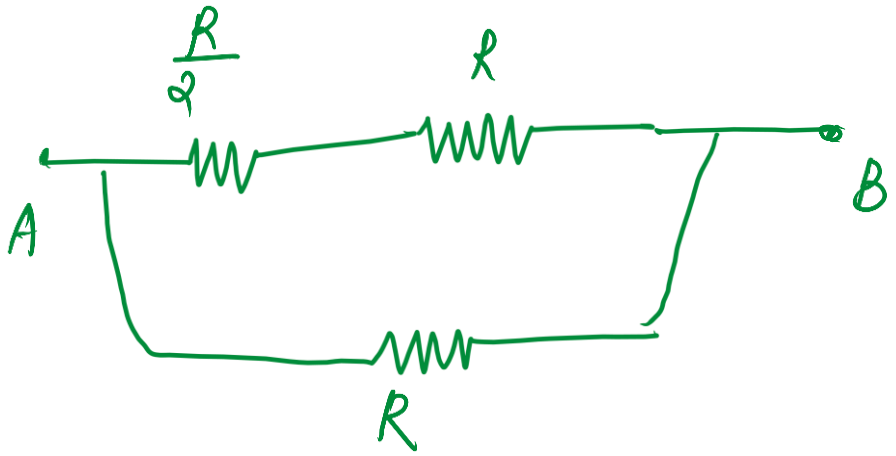
Which one of the following is the value of the resistance between points A and B in the circuit given above?

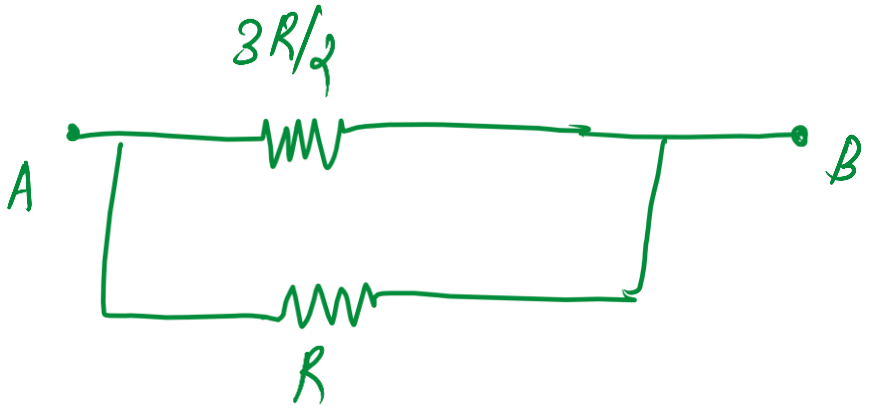
(a) $\frac{2}{5}R$

(b) $\frac{3}{5}R$

(c) $\frac{3}{2}R$

(d) $4R$



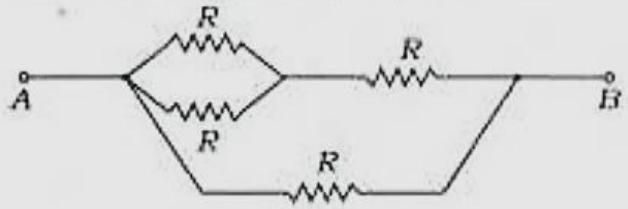


for 2 resistors in parallel, equivalent resistance $= \frac{R_1 R_2}{R_1 + R_2} = \frac{\frac{3R}{2} \times R}{3R/2 + R}$

$= \frac{\frac{3}{2}R^2}{\frac{5R}{2}}$

$= \frac{3}{5}R$

Consider the following circuit :



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(c) $\frac{3}{2}R$

(d) $4R$

Answer: (B)

Which one of the following is the value of 1 kWh of energy converted into joules ?

(a) $1{\cdot}8 \times 10^6$ J

(b) $3{\cdot}6 \times 10^6$ J

(c) $6{\cdot}0 \times 10^6$ J

(d) $7{\cdot}2 \times 10^6$ J

1 kWh

= 1 kW x 1 h

= 1000 W x 3600 s

= 3.6×10^6 Ws

= 3.6×10^6 J

1 J = 1 W x 1 s

Power (watt - W) = Energy / work (Joules - J) / Time (seconds - s)

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Answer: (B)

Which one of the following devices is non-ohmic ?

(a) Conducting copper coil

(b) Electric heating coil

(c) Semi conductor diode

(d) Rheostat

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Answer: (C)

Which one of the following can charge an insulator ?

(a) Current electricity

(b) Static electricity

(c) Magnetic field

(d) Gravitational field

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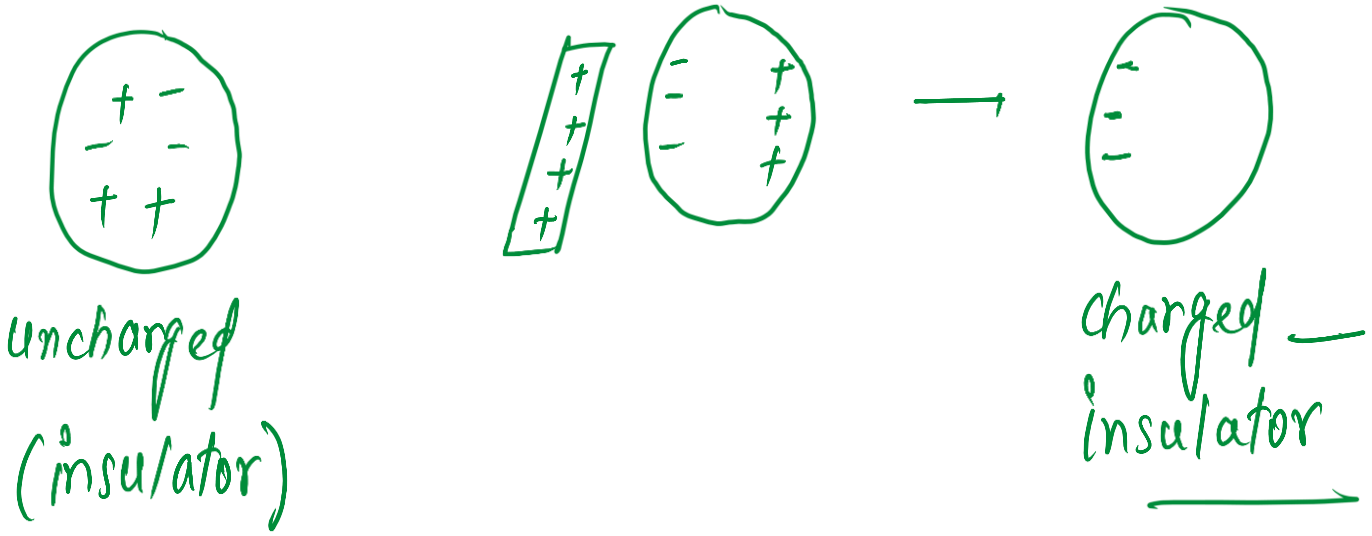

A current of 1·0 A is drawn by a filament of an electric bulb for 10 minutes. The amount of electric charge that flows through the circuit is

(a) 0·1 C

(b) 10 C

(c) 600 C

(d) 800 C

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(c) 600 C

(d) 800 C

Answer: (C)

charge = current × time

(Ampere) (seconds)

$= (1.0\ A) \times (10 \times 60\ s)$

$= 600\ C$

Which one of the following correctly represents the SI unit of resistivity?

(a) Ω

(b) Ω/m

(c) Ω cm

(d) Ω m

$R = \rho \frac{\ell}{A}$

R — Resistance, ρ — resistivity, ℓ — length of conductor, A — Area of cross section

$\rho = \frac{RA}{\ell} \rightarrow \frac{\Omega \times m^2}{m} = \Omega - m$

Which one of the following correctly represents the SI unit of resistivity?

(a) Ω

(b) Ω / m

(c) Ω cm

(d) Ω m

Answer: (D)

Which one of the following formulas does ***not*** represent electrical power ?

(a) $I^2 R$

(b) $I R^2$

(c) $V I$

(d) V^2 / R

P = pot. diff $\times$ current

$= VI$

$= (IR) I = I^2 R$

$= V\left(\frac{V}{R}\right) = \frac{V^2}{R}$

Power — VI | I^2R | $\frac{V^2}{R}$

Which one of the following formulas does ***not*** represent electrical power ?

(a) $I^2 R$

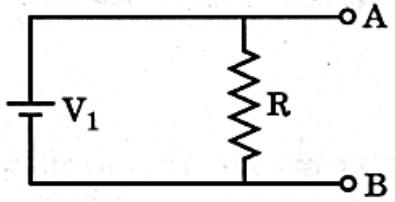
(b) $I R^2$

(c) $V I$

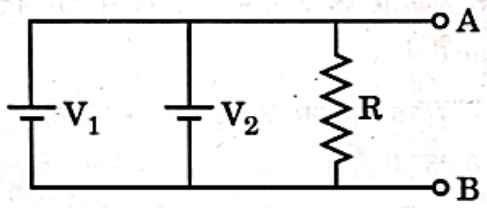
(d) V^2 / R

Answer: (B)

An electric circuit is given below. $V_1 = 1$ V and Resistance R = 1000 Ω.



The current through the resistance R is very close to 1 mA and the voltage across point A and B, $V_{AB} = 1$ V. Now the circuit is changed to :



where value of V_2 = 5 V. The internal resistances of both the batteries are 0·1 Ω. The current through the resistance R is about :

(a) 1·0 mA

(b) 1·2 mA

(c) 3·0 mA

(d) 5·0 mA

(internal resistance)

$$V = \frac{\left(\frac{V_1}{r_1} + \frac{V_2}{r_2}\right)}{\left(\frac{1}{r_1} + \frac{1}{r_2}\right)} = \frac{\frac{1}{0.1} + \frac{5}{0.1}}{\frac{1}{0.1} + \frac{1}{0.1}} = \frac{6}{2} = 3\,V$$

$$I = \frac{V}{1000\,\Omega} = \frac{3}{1000\,\Omega} = 3 \times 10^{-3}\,A$$

$$= 3.0\,mA$$

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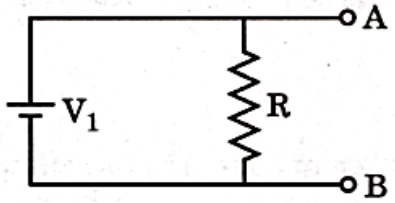

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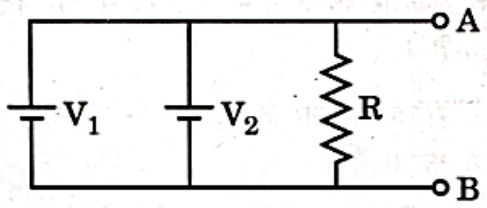

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(c) 3·0 mA

(d) 5·0 mA

ANS : C

MAGNETISM

closed curves,

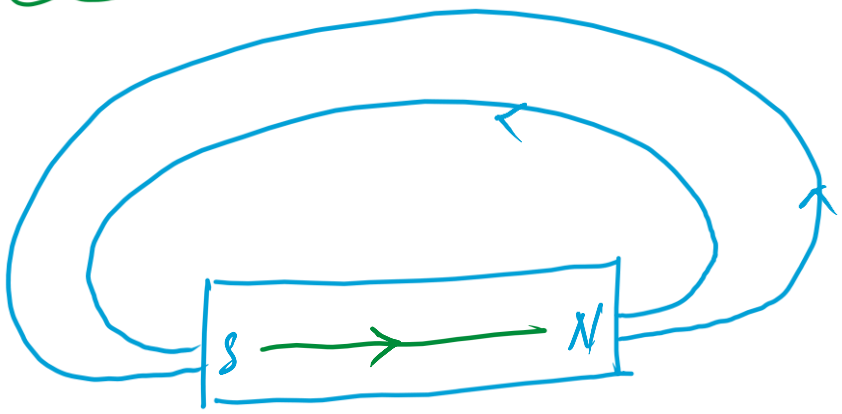
1. Which one of the following statements about magnetic field lines is NOT correct ?

(a) They can emanate from a point

(b) They do not cross each other

(c) Field lines between two poles cannot be precisely straight lines at the ends

(d) There are no field lines within a bar magnet



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Answer: (D)

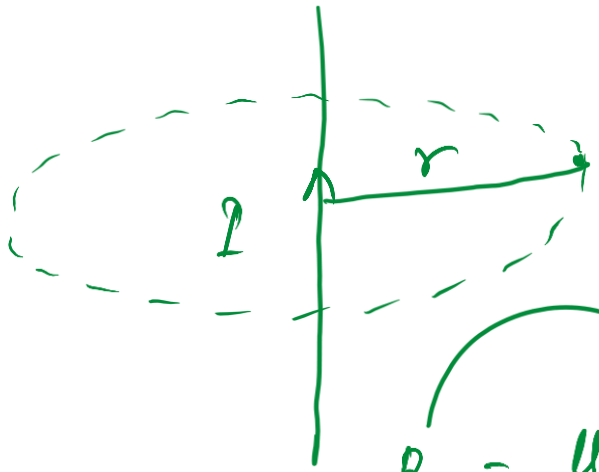
2. The magnetic field strength of a current-carrying wire at a particular distance from the axis of the wire

(a) depends upon the current in the wire

(b) depends upon the radius of the wire

(c) depends upon the temperature of the surroundings

(d) None of the above



$$B = \frac{\mu_0 I}{2\pi r}$$

$$B \propto I$$

2. The magnetic field strength of a current-carrying wire at a particular distance from the axis of the wire

(a) depends upon the current in the wire

(b) depends upon the radius of the wire

(c) depends upon the temperature of the surroundings

(d) None of the above

Answer: (A)

Consider the following statements about a solenoid :

1. The magnetic field strength in a solenoid depends upon the number of turns per unit length in the solenoid
2. The magnetic field strength in a solenoid depends upon the current flowing in the wire of the solenoid
3. The magnetic field strength in a solenoid depends upon the diameter of the solenoid

Which of the statements given above are correct ?

(a) 1, 2 and 3

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1 and 2 only

$B = \mu_0 n I$

n → no. of turns per unit length,

Consider the following statements about a solenoid :

1. The magnetic field strength in a solenoid depends upon the number of turns per unit length in the solenoid
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Which of the statements given above are correct ?

(a) 1, 2 and 3

(b) 1 and 3 only

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(d) 1 and 2 only

Answer: (D)

4. Which one of the following statements regarding magnetic field is NOT correct ?

(a) Magnetic field is a quantity that has direction and magnitude

(b) Magnetic field lines are closed curves

(c) Magnetic field lines are open curves

(d) No two magnetic field lines are found to cross each other

4. Which one of the following statements regarding magnetic field is NOT correct ?

(a) Magnetic field is a quantity that has direction and magnitude

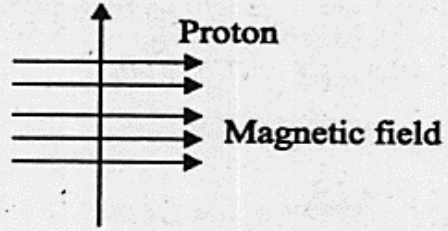
(b) Magnetic field lines are closed curves

(c) Magnetic field lines are open curves

(d) No two magnetic field lines are found to cross each other

Answer: (C)

Consider the following image :



A proton enters a magnetic field at right angles to it, as shown above. The direction of force acting on the proton will be

(a) to the right

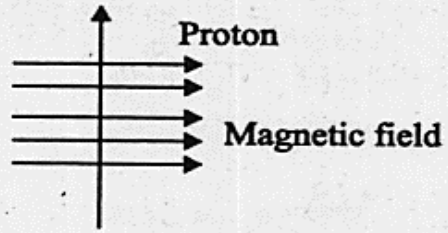
(b) to the left

(c) out of the page

(d) into the page

$$\vec{B} = q(\vec{v} \times \vec{B})$$

Consider the following image :



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Answer: (D)

Imagine a current-carrying straight conductor with magnetic field of lines in anti-clockwise direction. Then the direction of current is determined by

(a) the Right-Hand Thumb rule and it would be in the downward direction.

(b) the Left-Hand Thumb rule and it would be in the downward direction. ✗

(c) the Right-Hand Thumb rule and it would be in the upward direction. ✓

(d) the Left-Hand Thumb rule and it would be in the upward direction. ✗

B — I

clockwise — inside / downwards

anti-clockwise — outside / upwards.

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(c) the Right-Hand Thumb rule and it would be in the upward direction.

(d) the Left-Hand Thumb rule and it would be in the upward direction.

Answer: (C)

The magnetic field produced by a current-carrying straight wire at a point outside the wire depends

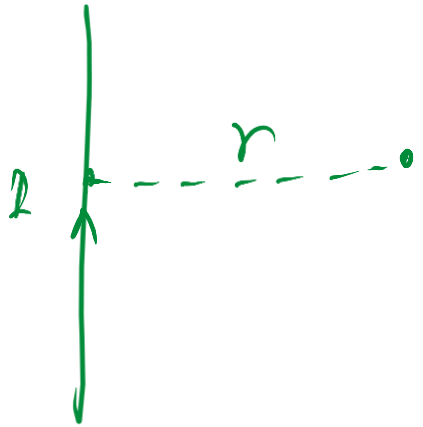
(a) inversely on the distance from it

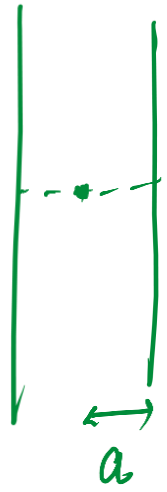
(b) directly on the distance from it

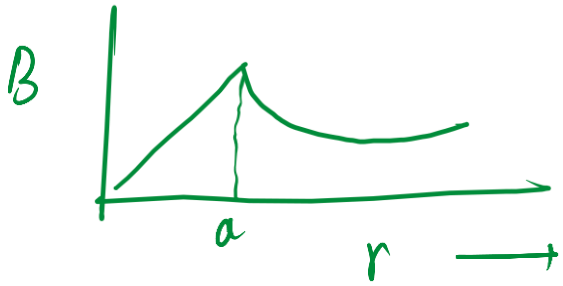
(c) inversely at short distances and directly at large distances from it

(d) directly on the distance (at short distances) and inversely on the distance (at long distances) from it

$B = \frac{\mu_0 I}{2\pi r}$ $\quad B \propto \frac{I}{r}$







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Answer: (D)

According to Fleming's right-hand rule, if the forefinger indicates the direction of magnetic field and thumb shows the direction of motion of conductor, then the stretched middle finger will predict the direction of

(a) force acting on the conductor

(b) electric field

(c) induced current

(d) current

According to Fleming's right-hand rule, if the forefinger indicates the direction of magnetic field and thumb shows the direction of motion of conductor, then the stretched middle finger will predict the direction of

(a) force acting on the conductor

(b) electric field

(c) induced current

(d) current

Answer: (D)

A DC generator works on the principle of

(a) Ohm's law

(b) Joule's law of heating

(c) Faraday's laws of electromagnetic induction

(d) None of the above

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Answer: (C)

The presence of magnetic field can be determined using which one of the following instruments?

(a) Ammeter

(b) Voltmeter

(c) Magnetic needle

(d) Motor

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Answer: (C)

A positive charge is moving towards south in a space where magnetic field is pointing in the north direction. The moving charge will experience :

(a) a deflecting force towards north direction.

(b) a deflecting force towards east direction.

(c) a deflecting force towards west direction.

(d) no deflecting force.

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Answer: (D)

Choose the incorrect statement from the following regarding magnetic lines of field

A. The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points

B. Magnetic field lines are closed curves

C. If magnetic field lines are parallel and equidistant, they represent zero field strength

D. Relative strength of magnetic field is shown by the degree of closeness of the field lines

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For a current in a long straight solenoid N and S poles are created at the two ends. Among the following statements, the incorrect statement is

(a) The field lines inside the solenoid are in the form of straight lines which indicates that the magnetic field is the same at all points inside the solenoid

(b) The strong magnetic field produced inside the solenoid can be used to magnetize a piece of magnetic material like soft iron, when placed inside the coil

(c) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet

(d) The N- and S-poles exchange position when the direction of current through the solenoid is reversed.

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A constant current flows in a horizontal wire in the plane of the paper from east to west as shown in Figure 13.5. The direction of magnetic field at a point will be North to South

(a) directly above the wire

(b) directly below the wire

(c) at a point located in the plane of the paper, on the north side of the wire

(d) at a point located in the plane of the paper, on the south side of the wire

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The strength of magnetic field inside a long current carrying straight solenoid is

(a) more at the ends than at the centre

(b) minimum in the middle

(c) same at all points

(d) found to increase from one end to the other

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To convert an AC generator into DC generator

(a) split-ring type commutator must be used

(b) slip rings and brushes must be used

(c) a stronger magnetic field has to be used

(d) a rectangular wire loop has to be used

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