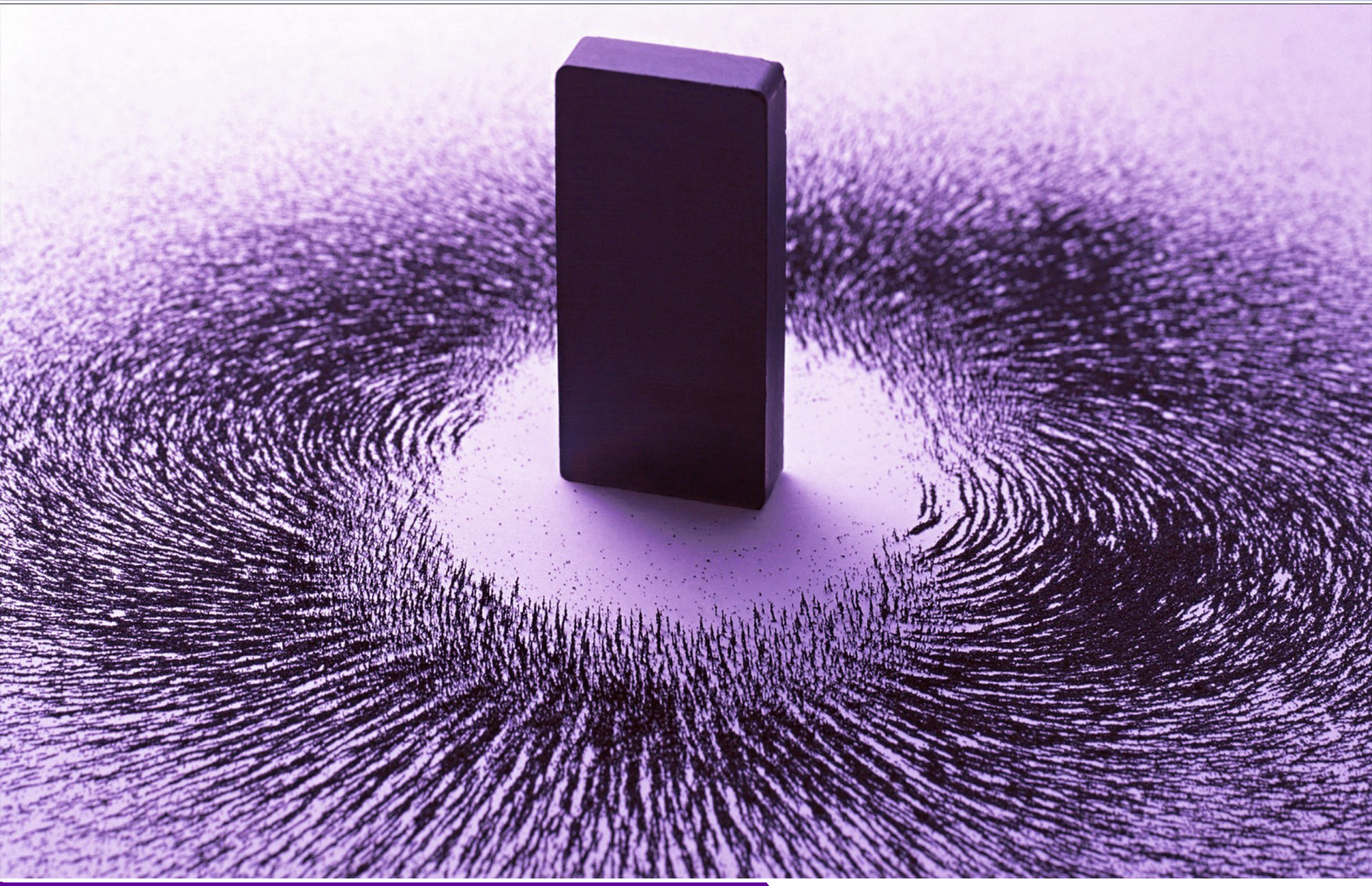
Fullmark In Physics

CH2

Final Revision

Part1 & Part2



No Pain ... No Gain

HA

Fullmark in Physics

Final Revision Chapter (2)

Q1) What's meant by:

1)Magnetic flux	Number of magnetic lines passing on area
2)magnetic flux density	Number of magnetic lines passing perpendicular on unit area
3)magnetic field	imaginary lines called magnetic flux lines .directed from N to S outside magnet and from S to N inside it .
4)magnetic permeability of medium	ability of medium to permit magnetic flux lines through it .
5)Ampere's right hand rule :	Imagine the wire to be grasped in the right hand with thumb pointing a long the wire in the direction of current, the direction of the fingers will have the direction of the magnetic flux lines as in figure.
6)right hand screw rule:	the direction of rotation of screw is the direction of current, and the direction of filed is in the direction of its motion
7)neutral point :	It is a point at which total magnetic field at it = 0 tesla .
8)Fleming left hand rule	Let your 3 fingers of left hand at right angles (fore, middle & thumb), such that, the fore finger points in direction of flux, the middle finger points in direction of the current, therefore the thumb in the direction of the motion (force)
9)magnetic dipole moment :	It is a vector . perpendicular to coil and emanating from north pole . and equal NAI and use screw rule to detect its direction .
10)sensitivity of galvanometer :	it's the scale deflection per unit current intensity.
11)shunt resistance : Or current divider	It's very small resistance connected in parallel to galvanometer coil to convert it into ammeter measures big current
12)multiplier resistance: Or voltage divider	It's very big resistance connected in series to galvanometer to convert it into voltmeter measures big potential difference
13)Analog instruments :	Device used to measure electric current . intensity and potential difference and resistance . and the reading appears as a pointer deflects upon a graduated scale .
14)digital instruments :	Device used to measure electric current . intensity and potential difference and resistance . and the reading appears as a numerical reading on a screen .
15)Tesla :	It's magnetic flux density acts by force of 1 N on wire of 1m length, carrying current of 1 Amp. and placed $\perp$ to magnetic field).
16)magnetic flux lines cutting an area = 10 weber :	Number of magnetic lines passing at this area = 10 weber .

17)magnetic flux density at a point = 0.3 wb/m² .	Number of magnetic lines passing perpendicular on unit area = 0.3 weber .
18) magnetic flux density at a point = 0.3 Tesla :	It's magnetic flux density acts by force of 0.3 N on wire of 1m length, carrying current of 1 Amp. and placed ⊥ to magnetic field).
19) magnetic flux density at a point = 0.3 N/A.m	It's magnetic flux density acts by force of 0.3 N on wire of 1m length, carrying current of 1 Amp. and placed ⊥ to magnetic field).
20)sensitivity of galvanometer = 5 division / M Ampere	it mean when a current 1 micro Ampere pass through a galvanometer . pointer deflects 5 divisions .
21)sensitivity of galvanometer = 60 M Ampere / division	It mean when 60 micro Ampere pass through coil of galvanometer . it deflect the pointer one division .
22)Galvanometer :	It is a device very sensitive to weak current and depends on torque . used to measure and detect presence and direction of very weak current .
23) Ammeter	It is a device to measure value of big current and contain shunt resistance connect in parallel with coil of galvanometer . its connected in series in circuit .
24) Voltmeter :	It is a device to measure value of big voltage and contain multiplier resistance connect in series with coil of galvanometer .its connected in parallel in circuit .
25) Ohmmeter :	It is a device to measure unknown resistance directly . contain battery and standard resistance in series to galvanometer .
26) standard resistance:	It's a resistance connect to galvanometer to make full scale deflection without any external resistance . and use to protect coil of galvanometer .
27)Clock wise rule :	Look to 1st turn, if current direction is clock wise ... the face is south and if anti clock wise . the face is north
28)standardization process :	It mean Adjusting the scale of ohmmeter and make the pointer at new zero resistance when current is max in circuit .
29)calibration process :	It means that, we put values of R on the scale of current. And get a scale of ohmmeter to can measure any unknown resistance .
30)sensitivity of galvanometer = 0.3 degree / MA	It mean if current 1 micro Ampere pass through galvanometer . its make deflection 0.3 degree .
31)magnetic dipole moment = 0.5 N.m/T	It mean that : there is a torque = o.5 N.m affected on coil placed parallel in a magnetic field = 1 tesla .

Q2)Give reason For :

1)attraction of 2 parallel conductors carrying current in the same direction ? Due to magnetic flux density between 2 conductors opposite to each other and at same direction outside of them , so B between wires < B outside , and wire moves to lower B so wires will attract

2)repulsion of 2 parallel conductors carrying currents in opposite direction ? Due to B of two wires between them at same direction but opposite outside so B inside > B outside and wire moves toward less B so 2 wires will repel .

3)the formation of neutral point between 2 parallel wires carrying current in same direction ? due to between the 2 wires B of each opposite to each other , and at mid point between them B is equal so there is Bt=0 and called neutral point

4)2 parallel wires are carrying currents at small distance apart but No neutral point is found ?because currents equal and opposite direction . so there is no neutral point at less B region

5)it is advisable to live away from high voltage tower ? to avoid harmful effect of magnetic flux density ($B \alpha 1/d$) as distance increase , B decrease

6)a straight wire carrying current and placed normal to magnetic field moves (affected by force) ?due to interaction (repulsion or attraction) that occur between field of wire carry a current and m.F that the wire placed in it . there is force on wire move it

7)Although a conductor carry a current and placed in a magnetic field . but does not move ?due to wire placed // to magnetic field so $\theta=0$ and since $F=BIL\sin\theta$. Force affect on wire = 0 N .

8)if an electric current pass in both a solenoid and straight wire . and straight wire placed inside the coil coincide to its axis .there is no magnetic force on this wire (not move) ? due to field inside solenoid is parallel lines , and wire in this case placed // to m.F so $\theta=0$ and F=0 , so not move

9) if an electric current pass in both a circular coil and straight wire . and straight wire placed inside the coil coincide to its axis or parallel to it .there is no magnetic force on this wire (not move) ? same answer of (8) but field of C.C oval circles // to wire

10) a circular coil or solenoid carry a current but magnetic field may not be produced ? coil is double wounded so current in one side opposite and equal to that in other so magnetic fields cancel each other

11)placing an iron core inside circular coil or solenoid in all devices ?to increase and concentrate flux due to Fe has high permeability

12)although a rectangular coil carry a current is placed in magnetic field . it does not move ?when coil placed normal to m.F $\theta=0$ and torque acting on coil also equal 0
($T = BIAN\sin\theta$)

13)Torque acts on rectangular coil carrying current and placed in magnetic field ?due to at this position , there is 2 sides affected by 2 F equal and opposite and not on same line so coil rotate and affect by torque .

14)the torque acting on a coil carrying current and placed parallel in magnetic field is maximum ?when coil // to m.F due to at this position $\theta = 90$ and normal distance between 2 sides affected by force is max so give max torque .

15)the torque acting on a coil decrease as the coil rotates from parallel position to magnetic field till reach 0 at normal position ? due to as coil rotate normal distance between 2 sides also decrease and angle decrease till becomes 0 at normal position and torque vanish

16) During the rotation of coil carrying a current between 2 poles magnet . the coil may nor stop at normal position and continue in rotation . ? due to inertia

17)the existence of iron cylinder and the 2 concaved magnet in all direct measuring instruments ?to concentrate and arrange field and make it as radii shape , so coil always // to m.F and obtain max torque . this make torque directly with passing current in coil .

18) the existence of pair of spiral springs in the galvanometer ? spiral springs act as input & output for current , and make resisting torque to the 1st torque in coils ,and return pointer to zero after end measuring .

19)presence of jeweled bearings in the galvanometer ? to minimize friction . and increase sensitivity of device

20)galvanometer scale has equal divisions (uniform) ? due to device contain Fe cylinder between 2 concaved magnet , this concaved make coil always // to m.F and B is constant so $\theta \alpha I$ an this make scale is uniform

21)the moving coil galvanometer can't measure high currents (Ampere) ? due to high current make big deflection in springs which make it damage so can't measure big current

22)the galvanometer is not suitable to measure A.C current ?due to galvanometer depends on torque which depends on direction of current bur A.C current change it's direction each half cycle

23)it is necessary to calibrate the moving coil galvanometer from time to time ?due to with time efficiency of springs decrease and ability of magnet decrease so must calibrated

24)the galvanometer should be connected to small shunt resistance to obtain an ammeter ?due to this small R decrease the total resistance of device and able it to measure big current when convert it to Ammeter and protect the galvanometer from high current

25)Ammeter connected is series in any circuit ?to obtain that current pass in ammeter equal to current pass in circuit . so reading of ammeter indicate current in circuit .

26)voltmeter connected in parallel in any circuit ?to obtain potential difference across voltmeter equal to potential difference across resistance or circuit so reading indicate same p.d

27)the existence of large multiplier resistance in series with galvanometer in voltmeter ?this R called multiplier resistance and used to increase total R and make device measure big p.d and decrease the withdrawn current)المسحوب so reading becomes more accurate .

28)the ohmmeter scale is not uniform ?due to current intensity is inversely with total resistance of device but we put only R_{add} on the scale , so scale non uniform
(if add Rapp to each read .. become uniform)

29)using rheostat or fixed resistance or standard resistance in ohmmeter ?to obtain full scale deflection without any external resistance and to protect coil of Galvanometer

30)battery used in ohmmeter must have fixed emf ? due to as emf in ohmmeter changed . all calculation and graduation will change .

31)the scale of ohmmeter oppose that for Ammeter ? due to current in circuit is inversely with total resistance of device

32) the precision of ammeter increase by decreasing the value of shunt resistance while the precision of voltmeter increase by increasing the value of multiplier resistance used? as Rs dec , total R of ammeter Dec and affect of resistance of A dec so precision increase .while in voltmeter . as Rm increase , total resistance of device increase and withdraw current decrease . so precision increase .

Q_3)Mention factors affect on:

1-magnetic flux density

.....

a-at a point away from straight conductor carrying current

.....

b-at center of circular coil

.....

c-at axis of solenoid

.....

2-magnetic force acting an straight conductor carrying current and placed normal to mag. field

.....

3-magnetic torque acting on a coil carrying current and placed parallel to field

……

4-magnetic dipole moment

……

5-matual attraction between two wires carrying current

……

6-Torque acting on galvanometer coil

……

Q_4- What happens if ?

1- An electric current passes in two parallel straight conductors:

……

……

2- Placing a magnetic needle at the center of a coil carrying current.

……

……

3- Placing a wire carrying current coinciding with the axis of a solenoid carrying current.

……

……

4- Placing a coil carrying current in a mag. Field with its $//^{el}$ mag. Flux line.

……

……

5- Placing an iron core (rod) inside a solenoid carrying current.

……

……

6- Placing a conductor carrying current $\perp$ to mag. flux lines of a mag. field.

……

……

7- Connecting a small resistance in a parallel with a moving coil galvanometer.

……

……

8 – Connecting a high resistance in series with the moving coil galvanometer.

……

……

9- Using a battery of changing emf in the circuit of Ohmmeter.

……

……

10-To magnetic flux density If length of solenoid stretched to increases by50% and the current reduced to quarter its value

……

……

11-The value of multiplier resistance increase

……

……

12-Using bar magnet instead of concave magnet in galvanometer

……

……

13-to magnetic flux density at axis of solenoid if it stretched to double its length

……

……

14-Decreasing value of standard resistance in ohmmeter

……

……

15- to B on solenoid if 1/4 of solenoid length is removed while source of emf is same

a)increase value of multiplier connected to galvanometer

……

b)there is no variable resistance in ohmmeter

……

c)decrease value of shunt resistance connected to galvanometer

……

d)add resistance of ohmmeter to its scale during calibration

……

Q_5) WHEN the Following =0

1-magnetic torque acting on coil carrying current and placed in magnetic field

……

2-magnetic force acting on straight conductor carrying current and placed in magnetic field

……

3-magnetic flux density

a-at med point between two parallel straight conductor and both carry a current

……

b-at center of two coincidence coils carrying a current

……

c-at point out side two parallel straight conductor and both carry a current

……

4-the measured resistance by ohmmeter=0

……

Q6)What are the conditions of ???

1. **Obtain large magnetic field from wire carrying current.**

……

2. **Obtain large magnetic field from coil carrying current.**

……

3. **Obtain large magnetic field from solenoid carrying current.**

……

4. **No neutral point found due to two parallel straight wires carrying current.**

……

5. **Neutral point found in mid distance between two parallel straight wires carrying current.**

……

6. **The force acting on wire carrying current placed in a magnetic field is maximum.**

……

7. **Two parallel wires carrying current attract to each other.**

……

8. **Two parallel wires carrying current repel from each other.**

……

9. The torque acting on coil carrying current placed in magnetic field is maximum.

……

10. Minimize friction during rotation of galvanometer coil.

……

11. Convert the galvanometer to ammeter.

……

12. Convert the galvanometer to voltmeter.

……

13. Convert the galvanometer to ohmmeter.

……

14. Scale of ohmmeter is uniform

……

Q_7)When the following is maximum:

1-galvanometer of ohmmeter give max current intensity

……

2-wave length of Bracket series

……

3-intensity of black body radiation

……

4-torque or induced emf of rotating coil

……

5-force acting on straight conductor

……

6-maximum flux passing through a coil

……

Q_8)Prove that

1- **Derive (prove-deduce) an expression for:-**

a-The magnetic force acting on a current carrying conductor placed in a mag. field,

……

……

……

……

b-The torque acting on a rectangular current loop placed in a uniform mag. field.

Or (Egypt 91) Write the scientific idea upon which the moving coil galvanometer is based and deduce the mathematical relation which deals with this idea. And then mention scientific idea of voltmeter and ammeter

……

……

……

……

……

……

……

……

$Q_{9)}$ (Egypt 95) you have a moving coil galvanometer, the coil resistance is R_g and the maximum current is Ig explain how can you convert it to:

(a) Ammeter to measure a current (Sudan 2016)

(b) Voltmeter to measure potential difference V >Vg.

(c) Deduce the relation (formula) used in each case.

.....

.....

.....

.....

.....

.....

.....

.....

Q)10- **A free magnetic needle in horizontal plane does not move, although a straight wire carrying current placed normal to it.**

Figure 1 shows two vertical wires A and B, viewed from above, which are equidistant from the point P. Ignoring the effect of the Earth's magnetic field, draw separate diagrams to show the direction in which a small compass needle placed at P will set:

-

(a) W-hen a current flows upwards, out of the paper, through wire A and there is no current in B.

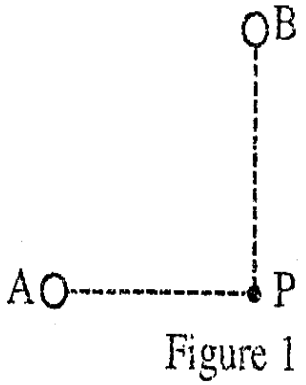


Figure 1

.....

.....

(b) When a current flew upwards through wire B and there is no current in A.

.....

(c) When each wire carries a current of the same value upwards.

.....

Q11)- in the opposite figure if the resistance of wire xy is R ,and the current intensity in circuit is I incase of open the key K

a-what is the type of mutual force between the two wires ab & xy

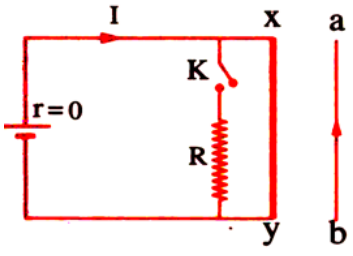
.....

.....

b-on closing the key k **<u>what happen</u>** to this force and **<u>why</u>**

.....

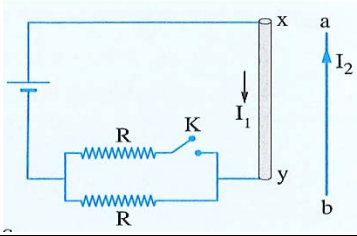
.....



<u>12-Choose the correct answer:</u>

-In the opposite circuit, a wire xy of resistance (R) carrying electric current I_1 placed parallel to another wire (ab) carrying electric current I_2, a magnetic force (F) is produced between them, when switch K is closed then, the value of the mutual force between the two wires .....

a. decreases. **b. increases.** **c. remains as it is**



Q)13-Choose the correct answer:

1) An electric current passes in a straight conductor, create a mag. Flux of density (B) at a distance (d) from axis of wire, then if current intensity is doubled, the mag. Flux density at distance ($\frac{d}{2}$) from the axis of the wire is (B – 2B – 4B).

2) Coil Carrying current has a mag flux density at its center (B). if it is unwound and then rewind to form a new coil of half radius of initial coil. If current intensity is the same, then the mag flux density at the center of the new coil is (B – 2B – 4B).

3) A solenoid carrying current has a mag flux density (B) at a point on its axis. If it is stretched to double its length with same current intensity, then the mag flux density at a point on its axis is (Decreases to 1/4 - ½B – 2B)

4) Two parallel straight conductors carrying currents, the force between them is (F). If current intensity in both wire, is doubled, and distance between them is decreased to the half, then the force is (F - 2F – 4F – 8F).

5) In the last question if current intensity is doubled in one wire, and distance between them is doubled then the force is (F - 2F – 4F – 8F).

6) A straight conductor carrying current coincides with the axis of a solenoid carrying current, then the force acting on the straight conductor is given by (F = BIA sin θ - F = BIAN sin θ - Zero).

7) A straight conductor carrying current passes by the center of a circuit coil carrying current and $\perp$ to its plane, then if current in straight conductor is doubled, the force acting on it is (doubled – decr. to half - zero).

8) A straight conductor carrying current (I) placed perpendicular to mag. Field is acted by a force 10N. if the wire rotates by angle 60^0 from its position then the force becomes (5N – 8.66V - zero).

9) A coil carrying current placed parallel to mag.field is acted by a torque of 10N.m. if the coil rotates from his position by angle 60^o then the torque becomes (5 – 8.6 - zero) N.m

10) When a coil carrying current of diameter (D) is stretched to form a solenoid of length (L), then the mag flux density at the axis of solenoid is equal to that was at the center of coil when (L=2D - D=2L - D=L).

11) Moving coil glav. Is based on (electromagnetic induction – thermal effect of electric current)

12) A stunt resistance Rs connected in parallel to a glav. (Rg) decreases its sensitivity to $\frac{1}{10}$, then (Ig = 10I – I=10Ig – I=$\frac{1}{10}$Ig) and in this case (Rg = 10Rs – Rg=9Rs – Rg = $\frac{1}{10}$Rs).

13) If a measured resistance of 200Ω makes half scaled defection of ohmmeter then if deflection drops to $\frac{1}{3}^{rd}$ of scale, the measured resistance is (600Ω - 400Ω - 300Ω).

14) For ohmmeter when measured resistance is higher than to times the half scale value, the measurement is, ……. (accurate - inaccurate) due to (scale is not uniformly divided – scale divisions are crowded).

15) A galvanometer has a coil resistance = Rg, then the value of the shunt resistance needed to decrease its sensitivity to quarter is = (Rg/3 – Rg/4 – 3Rg – 4Rg).

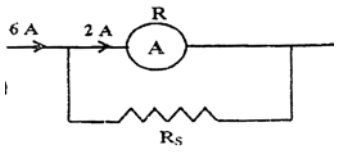
16) A galvanometer has Rg = 20Ω. If it is shunted by a 5Ω resistance then its sensitivity decrease to [$\frac{1}{5}-\frac{1}{4}-\frac{1}{3}$]

17) If the ratio between the shunt resistances to the galvanometer resistance in an ammeter is 1: 4, then the ratio bet. The current passing in the galvanometer to the total current in the ammeter is: (1: 3 - 1 : 4 - 1: 5).

18) A galvanometer having resistance 4 Ω is converted into an ammeter by connecting a 4 Ω shunt resistance across it. in order to double the range of this ammeter, the additional shunt resistance to be connected across it is……..

(2 Ω , 4 Ω, 8 Ω , 1.5 Ω)

19)The resistance of an ammeter of range 2A is (R), so the shunt resistance (R_s) required to make its range 6A is……(R , $R/3$, $R/2$, $R/4$)

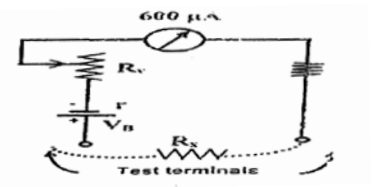


20 a-) R_s/R_{amm} (> − < − =)one **20b) I_g/I_s(> − < − =)one**

21 a) V_g/V_s (> − < − =)one **21 b) $-V_g/V_m$ (> − < − =)one**

22 a) R_m/R_{voltm} (> − < − =)one **22 b-) I_g/I_m (> − < − =)one**

23) In the shown circuit the maximum deflection of the galvanometer is 600 μA when the terminals of circuit is connected together. If resistance (R_x) equals the double of the total resistance of circuit is introduced then the maximum deflection will be…….(200 μA , 300μA , 600 μA , 1200 μA)



24) If the unknown resistance that measured by the ohmmeter is twice the total resistance of the instrument, then the pointer of the ohmmeter will deflect to ……the scale.(half , one third, quarter

25) If a resistance of 200 Ω makes the ohmmeter pointer deflects to $\frac{1}{2}$ the scale, so the value of resistance make it deflect of$\frac{1}{3}$ the scale is……..(600 Ω, 400 Ω , 200 Ω , 300 Ω)

26) When an external resistance (R_x) is connected to terminals of an ohmmeter of resistance (R). The pointer deflects to the quarter of the full scale current, then the value of (R_x) is……(2 R , 3R , 4R , 5R)

27) If an ohmmeter used to measure 150 Ω, pointer reduced $1/5$ of the full scale current. Then the value of (R_x) needed to decrease the reading to $1/8$ its value is…… Ω .(37.5 - 26.5 - 262.5 - 30)

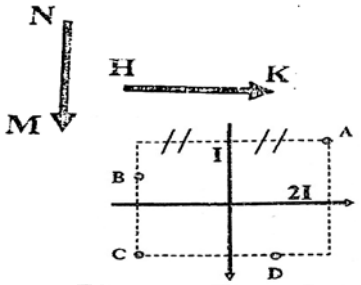
28) an ohmmeter reads 100Ω when its current intensity deflect to half its value so its reading when its current decrease to$\frac{1}{4}$ *its maximum value is* (400 Ω - 200 Ω - 300 Ω - 50 Ω)

29) the ratio between resistance of current divider that decrease sensitivity to quarter to resistance of another current divider that decrease sensitivity to 1/6 is……[greater than – less than –equal) one

30) by increasing potential difference in Coolidge tube the wave length that decreases is related to [line spectrum - continues spectrum –both] (chapter 6)

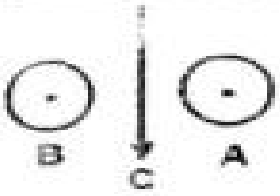
31) In alternative current dynamo if angular velocity= ω so it's periodic time equal **(chapter 3)**
[$/2\pi - \pi/2\omega$ - $2\pi/\omega$ - no answer is correct]

32) In the figure shown, MN is a long wire carrying current.
HK is another wire carrying current.
The force on the wire HK acts…….
(vertically upwards – vertically downwards – leftwards – rightwards)

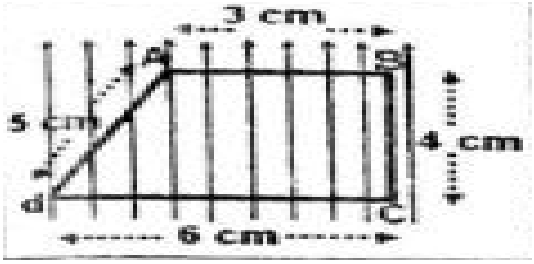


33) In the figure two insulated wires normal to each other passing through them currents of intensities I, 2I.
So the neutral point is at point……..(A – B – C – D)

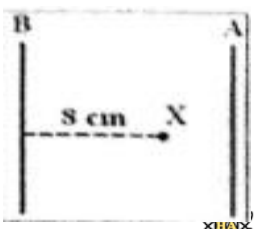
34) In The following figure , three wires carry different currents , wire C will :
a)attract to A b)attract to B c) not move



35)a coil ABCD carry a current I placed in magnetic field B as in figure .
Which side affect by max force ?
(CD / DA / AB / BC)

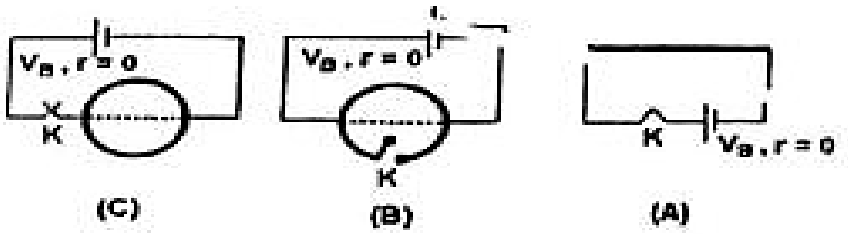


36) A and B two wires carry a currents (I and 2 I) respectively .x is neutral point Between them .find distance between 2 wires . then if current reversed in wire B Find distance of new neutral point to wire B . (12 / 24/10/16) cm .



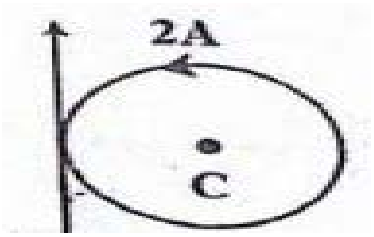
37) torque acting on coil make angle 60 with field equal to magnetic dipole moment when coil parallel to magnetic field of same field .magnetic flux density of this field equal (1 - 1/2 - 2) tesla

38)a wire has constant resistance per unit length , connected to battery and key as in figures .



Ratio between resistances of circuits A :B:C is :(2:1:0.5) (1:0.5:0.25) (4:2:1)(all answers correct)

39)shunt resistance connect to galvanometer , range of galvanometer increase 3.5 times ,
Rs = (Rg/7 – 2Rg /3.5 – 2Rg/5 – Rg/8)

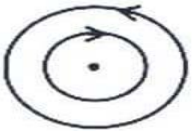


40) current must pass in wire ,to make C neutral point is :
a)more than 2 A
b)less than 2 A
c)equal 2 A

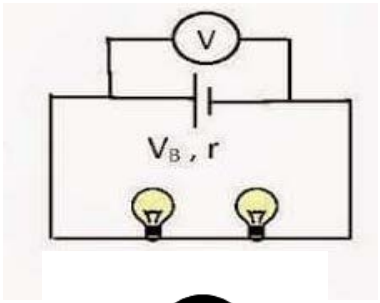
41) an electric current pass in circular coil and make B at center of it .when current intensity increase to double and increase diameter of coil to double .
B at center becomes (B/2 –B -2B)

42)a wire reshaped as ring carry a current . has magnetic flux density at center =B . then wire reshaped as coil of 4 turns carry same current . B2 = ……..
a)16B b)B/4 c)B/8 d)B/16

43) A circular coil is rewound to decreases its turns to half and connect it to the same current so the new flux density at center
(doubled – halved –increases 4 times –decreases to quarter)



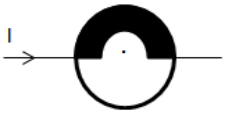
44) **in the opposite figure two rings carrying same current in opposite direction so the total flux density at center** a-equal zero b-out of page c- into page d-cannot determine direction



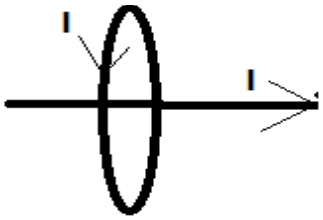
45) in the opposite circuit when the filament of bulb is blown off the voltmeter reading

a-Increase b- decreases c- unchanged d- zero

46) The direction of magnetic flux at the center of coil is
(out of the page - into the page – no field direction



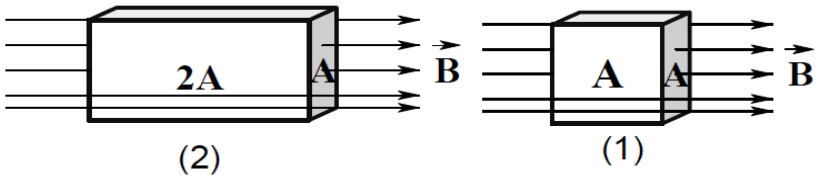
47)if infinite wire length carry current placed normal to plane of circular coil carry a current so the wire moves
a-upward b-down ward
c-out of page d-does not move



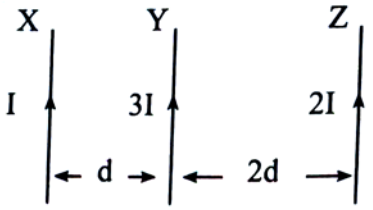
48) The value shunt resistance that decreases sensitivity 3.5 times is=…… R_g
(2/5 - 5/2 - 2/7 – 7/2)

49) Two bodies passing through them a magnetic field line as shown in figure if magnetic flux for body (1) equal ϕ_{B1} and for body (2) ϕ_{B2} so

a- $\phi_{B1} = \phi_{B2}$
b- $2\phi_{B1} = \phi_{B2}$
c- $4\phi_{B1} = \phi_{B2}$
d- $6\phi_{B1} = \phi_{B2}$

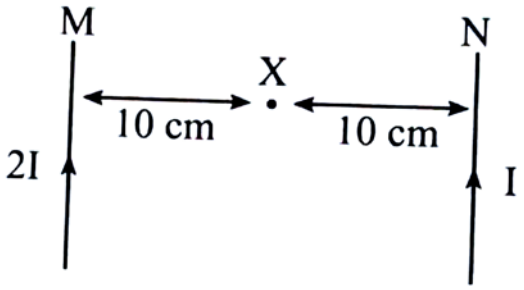


50)
(a) In figure, you have three long wires (X,Y and Z).
Which of these wires is not affected by a magnetic force?



51)
In figure, the wires (M and N) are very long. As the wire (N) is displaced 3cm towards the point (X), the total magnetic flux density at (X):

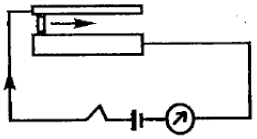
a-Increases.
b-Decreases.
c-Does not change.
d-Becomes zero



Q14) answer one only by (greater or less than or equal)

1)sensitivity of voltmeter at Rm =100 ohm ---------- that when Rm becomes 300 ohm
2)intensity of laser beam at wall when distance 2 m from source -------- that when distance becomes 1 m .
3) In the given figure two parallel conductors of high specific resistance, they are joined with a copper segment, so as such segment moves to the right as seen, the reading of ammeter .

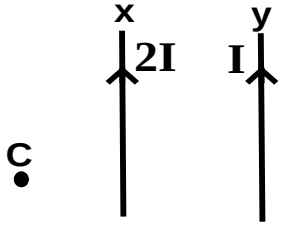
a. Increases. **b. Decreases.**
c. Unchanges. **d. Still at zero.**



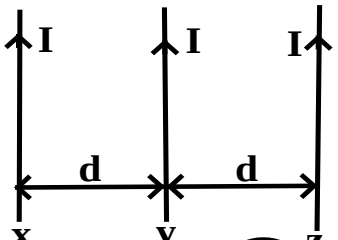
4) **A solenoid of length 60cm if we remove 10cm from each and connect the remain part to same current intensity so magnetic flux density at its axis**
(doubled – halved - same – decreases to 2/3)

Q15)Choose the correct answer:-

1) Two currents I,2I passes through 2 parallel wires as shown. At moving the wire (y) away from the wire (x), the total magnetic flux density at the point (c)……..
a- decreases.
b- increases.
c- not change.



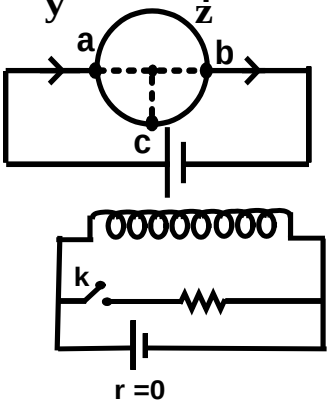
2) which of the 3 parallel wires is affect by smallest magnetic force?



……

3) **In the shown figure** a battery is connected to the 2 terminals of the diameter **a,b** of a metallic ring. If the battery is reconnect to the 2 points **a,c** ,the magnetic flux density at the center will:-

a) increase.
b) decrease.
c) not change.



4) In the shown figure, at switching on the key (K), the magnetic flux density inside the solenoid:-

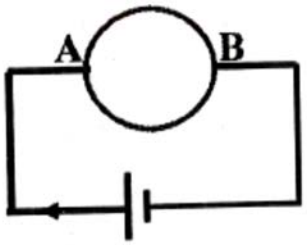
a) increase.
b) decrease.
c) not change.

5) As the ratio between the magnetic field intensity at two points **(x,y)** nearer to a straight long wire carrying d.c **[** $\frac{B_x}{B_y} = \frac{2}{3}$ **],** so the ratio between the normal distance between each point and the wire $\frac{d_x}{d_y}$ equals ……

1- $\frac{2}{3}$ **2-** $\frac{1}{3}$ **3-** $\frac{1}{6}$ **4-** $\frac{3}{2}$

6) One characteristic of the magnetic flux produced by an electric current passing through a solenoid:
*** in the form of uniform concentric circles.**
*** similar to the flux of a bar magnet.**
*** similar to the flux of a short magnet.**
*** its direction is determined by Fleming's right hand rule.**

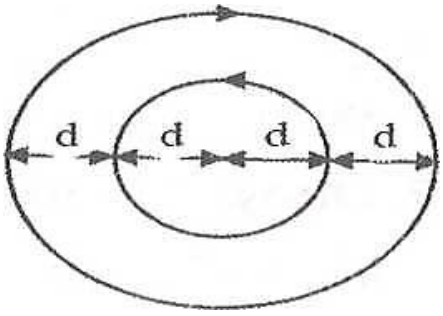
. **7)** A uniform wire of resistance 48 Ω is shaped as a closed ring. The ring is connected to a battery across the terminals of its diameter as shown.



The equivalent resistance between the points A and B is:

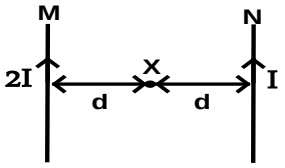
a. 12 Ω
b. 24 Ω
c. 48 Ω
d. 96 Ω

Q16) Two concentric copper rings carrying similar current intensity (I) as shown in figure, what change should be happened for the current intensity of the inner ring to provide a neutral point at the common center? Explain your answer.



Q17)

(a) The diagram shows two long parallel wires **(M and N)** through which electric currents **(2I and I)** pass respectively. **What change** should be done to the position of the wire **(M)** in order to make the magnetic flux density at the point **(X) vanish?**



.....

.....

.....

.....

.....

.....

.....

Q18) A circular coil is connected to a battery of negligible internal resistance. If a half of the coil turns is removed away and the remainder half is reconnected to the same battery, **what change has** happened to the density of magnetic flux at its center?

.....

.....

.....

.....

.....

.....

Q19)An ohmmeter has resistance **(R).** The pointer deflects to its zero scale as a current of **400 μA** passes through its circuit. A resistance **(R_x)** is connected externally to the ohmmeter terminals and makes the pointer deflect to $\frac{1}{8}$ of the current scale **Find** the ratio $\frac{R}{R_X}$??

.....

.....

.....

.....

.....

.....

Q20) A galvanometer of coil resistance (Rg) is connected to a multiplier of resistance **(2Rg)** to be converted into a voltmeter of a measuring range **(V1).** If this galvanometer is connected to a multiplier of resistance **(5Rg),** the measuring range of the new voltmeter becomes:

a) $3V_1$ **b) $2.5V_1$** **c) $2V_1$** **d) $0.4V_1$**

Q)21-WRITE the physical quantity and equivalent unit for each of the following

1- N/A^2		
2- N/A.m		
3- Nm/A		
4- Tesla.m/A		
5- Wb/m^2		
6- $Wb.A^{-1}.m^{-1}$		

7- N.m		
8- $A.m^2$		
9- N.m/tesla		

Q22) Prove that:

1-Tesla = $Kg/(amp.\ Sec^2)$,

……

……

2-Tesla = $Volt.Sec/m^2$

……

……

3-web=Nm/A

……

……

Q)23-IF you have a solenoid of length L and number of turns N connected to battery V_B of neglected internal resistance what happen to magnetic flux density at its center in each of the following case with reason

Case	What happen	reason
1-inserting iron rod in its core		
2-solenoid compressed to half its length		
3-cut it in two equal halves and connect each half to same source of battery		
4-cut solenoid to half and connect each half to same current		
5-rewound the solenoid in form of double wounded shape		
6-reshape the solenoid to increase diameter of turns with same length of wire and coil		
7-replace copper material of solenoid by another one made of aluminum		
8-1/4 of its length is removed and connect the remain part to same battery		

Q24) What happen to magnetic flux at circular coil center if its no of turns doubled with same diameter and connected to same battery?

……
……
……
……
……

Q)25-Solenoid (A) has length (L) and(N) turns, solenoid (B) has length (2L)and (N) turns, and solenoid (C) has length (L\2)and (2N) turns. If each solenoid carries the same current , rank the magnitudes of the magnetic fields in the centers of the solenoids from largest to smallest. Then explain your answer (Bc>Ba>Bb)

……
……
……
……
……
……
……
……

Q)26-show by drawing the difference between magnetic field of straight wire, circular coil and solenoid

Q27)-an iron wire of length L passing through it current I placed normal to magnetic flux density B so it affect by magnetic force F if the wire is replaced by another one similar but made of copper and connect to same power supply is the magnetic force change or not and why?

……
……
……
……
……
……

Q28) mention advantage and disadvantage of galvanometer .

Advantage	Disadvantage

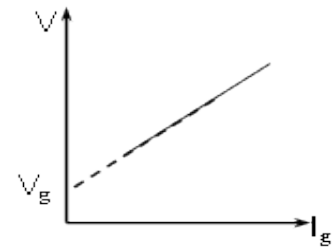
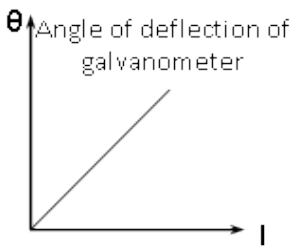
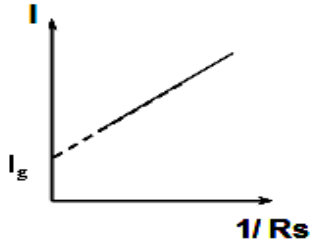
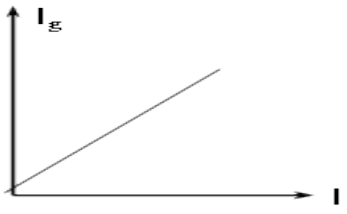
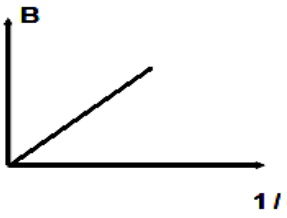
Q)29)Compare between :

	Ampere right hand rule	Right hand screw rule
Use or function :		
Statement of rule :		

	Ammeter	Voltmeter	Ohmmeter
Use or function :			
Resistance connect to galvanometer to obtain it .			
Used rule :			
Draw :			
Scientific base			
Scale			

	Shunt resistance	Multiplier resistance
Value :		
Function or use :		
Kind of connection to galvanometer :		
Law of it :		
Proof law :		

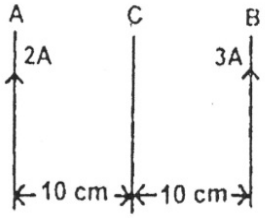
Q30)state slope and what does slope mean for each graph :

		
Relation :		
Slope :		
		
Relation : **Slope:**		

Problems

Straight wire:

1) In the shown figure 3 straight parallel wires, each of length 10 cm, the wires A, B are fixed while C is move freely. **Find:** the displacement of the wire (C) when a current flow through it and its direction of motion which make the total force acting on it equal zero.



……

……

……

……

……

……

……

2) 7.5x10 ^{20}electron , move through along straight wire through along straight wire in 3 sec . this wire is placed parallel to another wire at a normal distance 5 cm from the first wire if the second wire carrying current of 40 A calculate the value and direction of the magnetic flux density at a mid-point between them :

(a) The two current in the same direction.

(b) The two current in the opposite direction know that charge of electron is 1.6x10^{-19}C

……

……

……

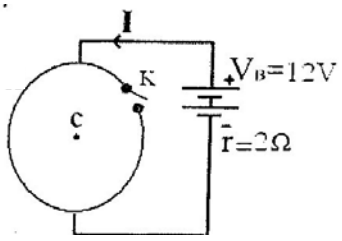
……

……

……
……
……
……

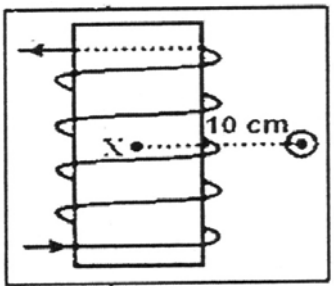
3) In the circuit shown in figure, the diameter of the metal ring is 2 cm, its resistance is 16Ω, find the magnetic flux, density at its center (c) given $\mu=4\pi x10^{-1}$ web/Am

i) when K is open ii) K is closed



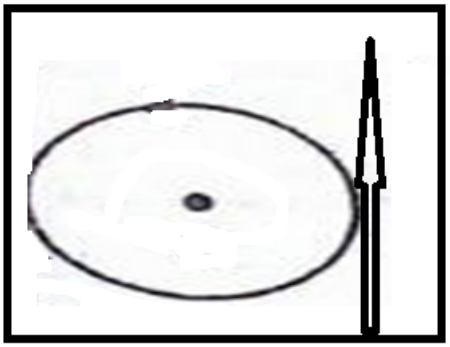
……
……
……
……
……
……

4) A straight wire normal to plane of paper carry current 8 A. away from x10 cm. which lie on axis of solenoid, solenoid has 5 turns/cm, and carry a current 0.7A. find Bt at point X.



……
……
……
……
……
……
……

5) **A long straight conductor carries current of intensity = I_1 = 11A touches circular coil of 5turns, all lie in one plane as shown in figure.**
i) Find the current intensity passing in the coil and its direction that makes a compass placed at its center shows no defection.
ii) Now if the current in the wire is reserved. Find the radius of the coil necessary to have the magnetic flux density at its center equal. 4.4 × 10^{-5} Tesla
(μ = 4 π × 10^{-7} web / A.m) use π = 22/7.



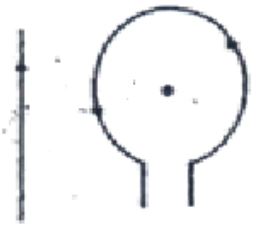
……
……
……
……

……

……

6) For the following figure:

A wire carrying a current of 40 ampere and a current of 2 ampere carrying circular coil of radius 2m cm and the distance between the center of coil and the wire 8cm. find the number of turns of such coil which causes total magnetic flux density at the center of the coil equals zero.



……

……

……

……

……

……

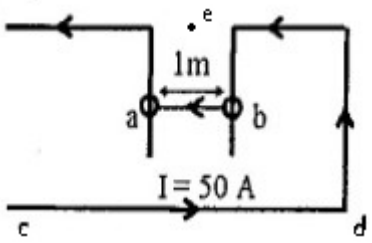
……

7) In the shown circuit find:

i) The total force acting on the wire ab of length 1m, of weight = 0.05Nifit is above cd by 2 cm

ii) The distance between the two wires at equilibrium

iii) The mag. flux density at point (e) which lies at distance 5 cm above wire cd at equilibrium ($\mu = 4\pi x10^{-7}$ web / Am)



……

……

……

……

……

……

……

8) A solenoid of length 60cm is connected to a cell of e.m.f = 3V of negligible internal resistance has a magnetic flux density (B_1) at a point on its axis. If length of 10cm is cut from each side and the rest of the solenoid is connected to the same battery, the magnetic flux density at the point is (B_2) Find the ratio (B_1/B_2)

……

……

……

……

……

……

……

……

……

9) A flat circular coil with 10 turns and diameter 2cm carries a current of 7A is mounted inside a solenoid of 200 turns and 20cm length carrying a current of 2.1 A, if permeability ($\mu = 4\pi \times 10^{-7}$ wb/amp.m). Find:

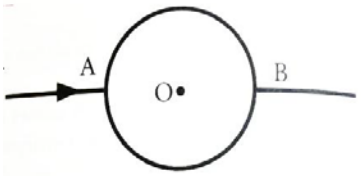
a) Magnetic flux density at the center of the coil when its axis perpendicular to axis of solenoid.

b) The magnetic dipole moment of the coil.

c) Torque required keeping the coil at its position

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

10-(Experimental2015) A straight wire of resistance 48 is shaped as a closed circular loop of diameter (d), and then a 6v battery is connected across its diameter as shown. Find:



1-The total resistance between the points (A,B)

2- The intensity of current through the loop wire

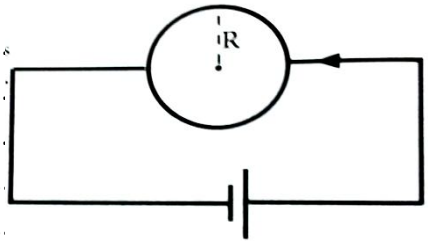
3-Explain why the magnetic flux density is zero at the loop center.

.....
.....
.....
.....
.....
.....
.....
.....

11-A wire of 0.05mm^2 is bent into the shape of a single circle of radius R=(20/π)cm, if the is connected to battery of emf =6V as shown in the diagram (if the current passing through the circuit is 2A), calculate

A- The resistivity of the materials wire

B- The magnetic flux density at the center



.....
.....
.....
.....
.....
.....
.....

……
……
……

12-(Experimental 2015) A straight metallic wire of length (I), cross sectional area 10mm^2 and the resistivity of its material 2.8x10^{-8} Ω. m is connected to a battery of emf3V and zero internal resistance.

1- Find the magnitude of the magnetic force affecting on the wire when placed perpendicularly to a magnetic field of flux density 10^{-3} Tesla
2- What happens to the magnitude of the force when the wire diameter is doubled?

……
……
……
……
……
……
……
……
……

13-a straight conductor of length 44m, radius = 4mm, and of resistivity 2.5x10^{-6}Ω.m is wound in the form of circular coil of radius 7cm. coil is placed in a mag. Field of density 2.5T and a p.d of 3.5 volts is applied on its ends. If π = $\frac{22}{7}$ find torque acting on it when:

i) Plane of coil is ⊥to mag. Field.
ii) Plane of coil is parallel to mag. Field.
iii) Plane of the coil makes angle 60^o with mag. Flux lines.
iv)The angle between ⊥ to coil plane and mag. Flux lines = 60^o

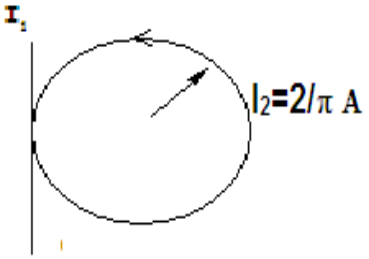
……
……
……
……
……
……
……
……
……

14- A straight wire in which a current of intensity 8 amperes passes, and beside it and at a distance of 16 cms from it an **electron beam** moves in the same direction of the current in the wire and at a rate of 10^{20} electrons per second. Calculate the magnetic flux density at mid-point between them. Given that e=1.6x10^{-19}c

……
……
……
……
……
……
……
……

15-For the given figure find the magnitude and direction of current I_1 in the wire to make the total flux density at the center of the coil = $3x10^{-5}$T out of paper if the coil has 10 turns and radius 10cm

$\mu=4\pi x10^{-7}$ N/A.m [5A]



16- A circular coil of radius 10 cm of 50turns carrying a current of 2A .Calculate the magnetic flux density at its center? If the turns of the coil is separated from each other regularly such that its length become 100cm .Calculate the magnetic flux density at the axis of the coil ? If a bar of iron of permeability (0.02Wb\A.m)is linked with the coil , what is the change in the magnetic flux density at its axis? **($6.283x10^{-4}$T, $1.256x10^{-4}$T,2T)**

17-Two long, parallel wires are separated by a distance of 2.5cm .<u>The force per unit length</u> that each wire exerts on the other is $4x10^{-5}$ N\m, and the wires repel each other .The current in one wire is 0.6A.

a-What is the current in the second wire ?

b-Are the two currents in the same direction or in opposite directions? (0.11A)

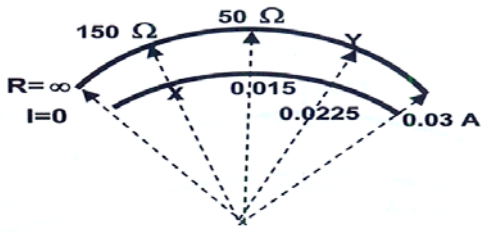
……
……

18-An ammeter of resistance 10Ω. gives a full scale deflection when a current of 15mA passes through it. It is required to convert it to an ohmmeter. Find the standard resistance when the E.M.F. is 1.5V. What is the resistance measured which causes a deflection of 10mA on the ammeter scale. Calculate the current that flows through the galvanometer when connected to an external resistor of 200Ω. [90 Ω, 50 Ω, 5 mA]

……
……
……
……
……
……
……
……
……
……
……
……
……
……

19-The adjacent graph represents a scale for ohmmeter, where the galvanometer resistance 25 ohm, standard resistance and a battery of negligible internal resistance. With the aid of the scale and using mathematical methods find:

1. **The resistance of the internal resistance**
2. **Emf of the battery.**
3. **The value of X and Y.**



……
……
……
……
……
……
……
……

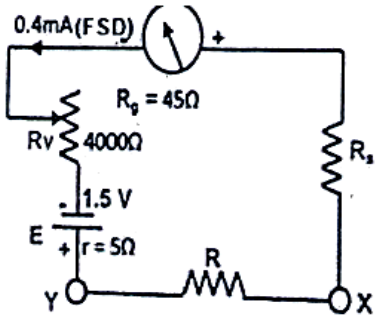
20- In the following figure Find:

a) The value of standard resistance (R_s), when we adjust the rheostat at a value of 3KΩ to give full-scale deflection of galvanometer.

b) The external resistance which makes the pointer deflects to 0.1 mA.

c) The external resistance which makes the pointer deflects to $(^1/_2)$ of the graduation.

d) The external resistance which makes the pointer deflects to (75%) of the graduation.



21- Two parallel straight conductor (A) and (B) carrying currents of 30 A and 40 A in opposite directions, the distance between them is 20 cm, given $\mu = 4\pi \times 10^{-7}$.
Web/A.m find:
i- the mag. flux density at point (e) out side them at 10 cm from (B).
ii- The magnitude and type of the mutual force between two wires if their common opposite length = 1m.
iii- The magnitude and direction of the force acting on a third wire (C) placed at point (e) parallel to both wires of length 50 cm carrying current of intensity 5A in the same direction as current in wire (B).

22-A galvanometer of resistance 5Ω of maximum scale deflection 2.5mA connected in parallel with 5Ω resistor, then a 997.5Ω resistor is connected in series with them. Find the maximum p.d that the apparatus can measure. **[5V]**

23-The resistance of a galvanometer is 90 Ω it is connected to a shunt of resistance 10.3 ohms. What will be the additional resistance needed to be connected in parallel to allow $\frac{1}{10}$ of the original current to pass in the galvanometer. (343.3 Ω)

24-An electric circuit contains a resistance of 10Ω. Connected in parallel with voltmeter of resistance 50 Ω, if the total current flowing through the circuit is 0.6 Amp, the voltmeter reads its maximum scale,

1- calculate the reading of the voltmeter,
2- if a resistor of 4950 Ω is connected in series to the coil of such voltmeter, calculate the maximum potential difference which can be measured by the voltmeter in this case.

25- A galvanometer of resistance 285 Ω, and full scale deflection current of 5mA. If a shunt of 15 Ω is connected, find the max. current that it can measure. Now it s required to increase its range of current measurement to be 150 mA using the same shunt find the resistance that must be connected in series with galv. (10mA -150 Ω)

26-A 20 Ω resistor is connected in parallel with a voltmeter of internal resistance 40 Ω. The voltmeter shows maximum deflection when the total current passing in them is 0.3A.

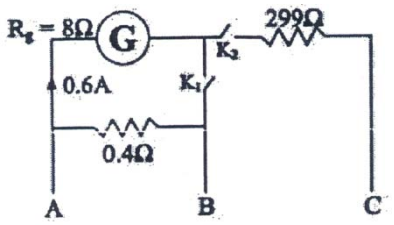
i) Find the reading of the voltmeter.(4v)

ii) If the voltmeter is removed from the previous circuit and connected in series with a resistance of 5960 Ω find the maximum potential difference that can be measured by the new device. (600v)

27-a sensitive galvanometer of resistance 50Ω it gives full scale deflection 0.002A it connected to multiplier potential 450Ω find the reading of such voltmeter ? and if this voltmeter we need to use it to measure current intensity we connect it to current divider 0.1Ω what is the max reading of current ?

28-From the following figure mention what happen to the galvanometer when:

1. K_1 closed.....
2. K_2 closed.....
   - **Calculate** the potential difference between terminal (A) and terminal (C) after closing Ki and K_2.



29)Exp 2016

a uniform insulated metallic wire of $A=4.25\times10^{-7}m^2$ is wound tightly as perfectly adjacent turns of one layer around an iron cylinder of diameter $10/\pi$ cm.to form a solenoid .the solenoid then is connected to a battery of emf (VB=10Volt) and r=0.the current passing through the solenoid is 5 A . (knowing that resistivity of wire material is 1.7×10^{-8} ohm.m .and the magnetic permeability of iron is 0.002wb/A.m . $\pi = 22/7$ .calculate :

1)number of turns of solenoid 2)magnetic flux density at point along the axis of solenoid .

30) the scale of a galvanometer is graduated into 50 division . each 10 divisions indicate 1 milli Ampere . and each 2 divisions indicate 1 milli volt .when it is used to measure the potential difference . How can we change it into :

a) an ammeter which measures up to 6 A .

b)a voltmeter such that each of its division indicates 0.1 volt .

31) A moving coil galvanometer . its coil does not bear a current more than 10 mA .it's resistance is 19.1 ohm .find the value of the resistance needed to modify the instrument to make it suitable :

1) as an ammeter for measuring max current up to 1 A .

2) as a voltmeter for measuring max potential difference of 5 volt .

3) as an ohmmeter , using a cell of 1.5 volt . showing the way of connection in each case .

32)proof that : diameter of circular coil carry a current calculated from relation Where L , length of wire used to make coil

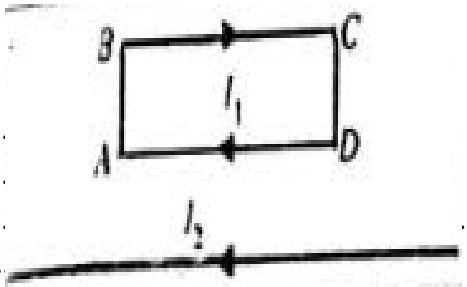
$$d = \sqrt{\frac{\mu I L}{\pi B}}$$

33)total force that the long wire which carry current I_2 affect on rectangle which Carry current I_1 :

a)toward long wire

b)away from long wire

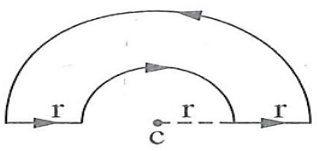
c)zero and ring is stable



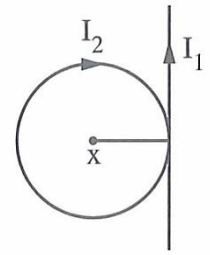
34) In the opposite figure if a current of 1 A is passed then value of the (1) flux density a point c is .....

a. $\frac{\mu}{8r}$ **b.** $\frac{\mu}{4r}$

c. $\frac{\mu}{2r}$ **d.** $\frac{\mu}{5r}$



35) An isolated straight wire carrying current of intensity (I_1) is placed tangent to a circular coil carrying electric current of intensity (I_2) and in the same plane as in figure , if the number of turns of the coil is N and the magnetic flux density at the center of the coil due to the flow of current in the wire and the coil respectively is (B_1, B_2) and B_1 is double B_2, prove that $I_1 = 2\pi N I_2$.



.....

.....

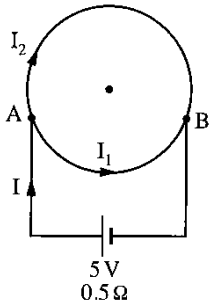
.....

.....

.....

.....

36) A copper wire its resistance 10 Ω coiled in the form of a circle, points A and B on the wire are connected to a battery its emf 5 V and its internal resistance 0.5 Ω , if the ratio between the length of the parts of the circle is 2 : 3, calculate the magnetic flux density at the center of the circle.



.....

.....

.....

.....

.....

.....

37)two parallel wires carry a current and have a neutral point at mid distance between them . when current of one of them is doubled .neutral point displaced by 3 cm .find distance between the two wires .

.....

.....

.....

.....

.....

38)**The pointer of ohmmeter deflects to $\frac{1}{4}$of its scale when it is connected to a resistance of 300 Ω. What is the value of the resistance which when measured makes the pointer deflects $\frac{1}{6}$of its scale**

.....

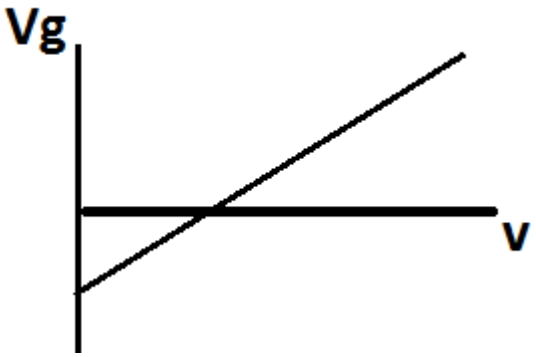
.....

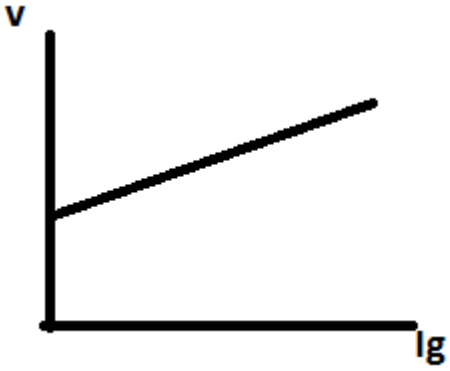
.....

.....

.....

39) Find slope and point of intersection of each graph





……

……

……

……

……

40) Mention one factor that increase each of the following :

1-Magnetic dipole moment

……

……

2-Accuracy of ammeter reading

……

……

41) A circular loop of length 20 cm, number of turns 100 turn and its resistance 6 Ω and is inserted in electrical circuit as shown in the figure, calculate the magnetic flux density at the middle of its axis in case of :

(a) Opening switch (K). (b) Closing switch (K).

(4.71×10^{-3} T ,3.14×10^{-3} T)

……

……

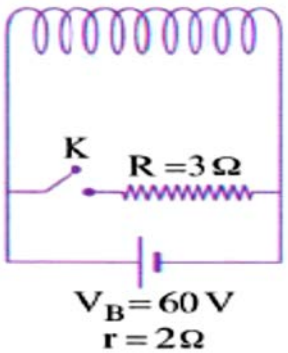
……

……

……

42) A circular coil of diameter 12 cm carries an electric current which generates a magnetic field at its center. If the coil is stretched uniformly in the direction of its axis such that it forms a solenoid and the same current flows through it. Calculate the length of the solenoid which makes the magnetic flux density at a point inside it along its axis = $\frac{1}{2}$ of that at the center of the circular coil.

(0.24 m)



……

……

……

……

……

43) In the opposite figure :

The ohms scale is added to the ammeter scale if the total internal resistance of the ohmmeter is 3750 **Ω** and the maximum current intensity 400 μA.

(a) Calculate the value of the resistors R_1 , R_2 , R_3

(b) What do you expect the value of R_4 will be ? And why ?

(1250 Ω, 3750 Ω, 11250 Ω)

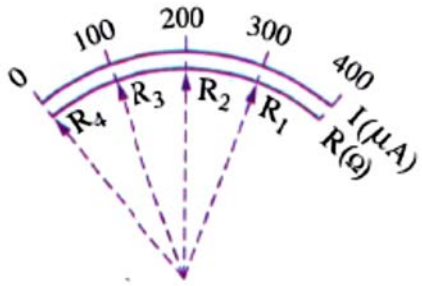
.....

.....

.....

.....

.....



.....

.....

.....

.....

.....

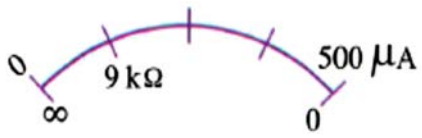
.....

44) The opposite figure represents equal divisions of the ohmmeter scale.

Use the shown data to find :

(a) The ohmmeter resistance.

(b) The electromotive force of the dry cell in ohmmeter. ***(3000 , 1.5)***



.....

.....

.....

.....

.....

.....

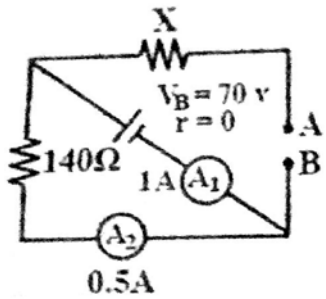
.....

.....

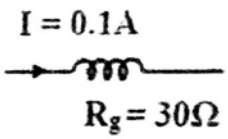
.....

.....

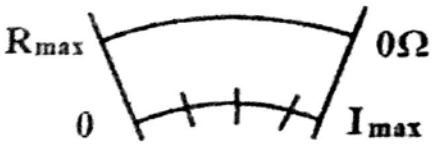
45)



(3)



(2)



(1)

In figure (1) if resistance of device 70Ω and we connect to it a resistance R that cause pointer deflect to ½ its scale

-If R connected in series with the device in figure 2, what is the max Potential that the device measure?

-If the resistance R connected between A and B in the circuit in fig. 3, what is the value of the resistance X?

……

……

……

……

……

46) compare between :

P.O.C	Electric motor coil	Sensitive galvanometer coil
direction of current		

47) **Show without drawing, how to convert a micro-ammeter of coil resistance 250 Ω, into an ohmmeter.**

R_x/Ω	$i/\mu A$
0	200
7500	100
∞	0

……

……

……

……

……

……

……

……

……

……

……

……

48)A galvanometer on resistance Rg, connected to shunt $R_g/2$, max I measured in this case = I_1

and if connected to shunt $R_g/5$, max I measured becomes I_2.

Find ratio $(\frac{I_1}{I_2})$.

……

……

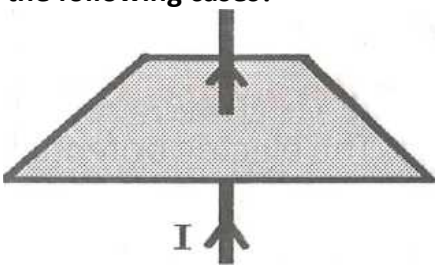
……

……

……

49) in the experiment presented in the figure, iron fillings are sprinkled on a horizontal cardboard sheet with a vertical connecting wire, what happens for the iron fillings in the following cases?

1- On passing d.c through the wire, and tapping the cardboard sheet gently.



……

……

……

2-On increasing the passing d.c through the wire, and continue tapping the cardboard sheet gently.

……

……

……

……

……

50) mention the rule used to determine the direction of ...

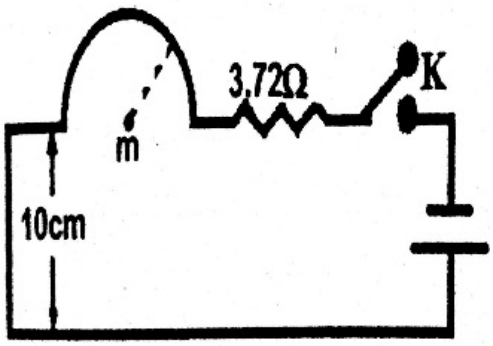
a- The magnetic force affecting a wire carrying

……

……

b-The magnetic field inside a solenoid carrying d.c at the instance of switching the current ON

……



……

……

51)Half of circular coil with 3.14 cm radius connected in series with 3.72ohm resistance and with electric source of emf= 24v and internal resistance =2ohm When the key (k) is switched off the magnetic flux density at the point " m" is 2.4×10^{-5} tesla (π=3.14)

Calculate : 1- the resistance of the wire of the circular coil

2-the resistivity of the material of the circular wire if the wire radius is 0.1 cm

.....

.....

.....

.....

.....

.....

52) A galvanometer of resistance **5Ω** gives maximum deflection under voltage **0.1V, Find:-**

a) The maximum current can measured by using a shunt 0.1Ω.

b) The required multiplier to convert the galvanometer into voltmeter of full scale **5V.**

.....

.....

.....

.....

.....

53) How you can obtain neutral point between 2 wires carrying current at distance from one of them equals $\frac{1}{4}$ the distance between the two wires

.....

.....

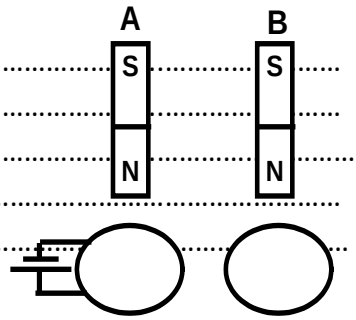
.....

.....

.....

54) two identical magnet fall freely downwards through two rings from same height as shown,

Which of the two magnets reach the earth surface before the other?



.....

.....

.....

.....

.....

55) chapter (3)

If the current of a dynamo increase from zero to [0.5V_{max}] in a time (t) so it is become [- 0.5V_{max}] from zero in time ……

a) 2t

b) 3t

c) 7t

d) 12t

56) A coil of **100 turns** and cross section area **200 cm^2** placed with angle **60^0** to magnetic flux of density $\sqrt{3}$ **Tesla , <u>Find:</u>**

a) The magnetic flux through the coil.

.....

.....

.....

b) The acting torque on the coil when current **2A** passes in it.

.....

.....

.....

.....

c) The induced e.m.f if the magnetic field is vanished during **0.1 sec.**

.....

.....

.....

.....

57) A voltmeter of internal **300Ω** can measure voltage up to **V_g**. **<u>Calculate</u>** the value of the required multiplier to measure voltage up to **10 times**

.....

.....

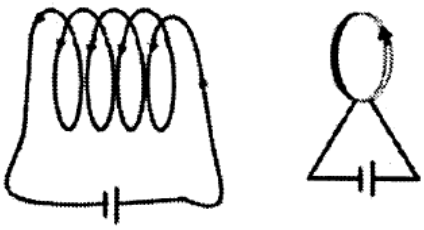
.....

.....

.....

58)

Calculate the current passing through a solenoid of length 20cm and 5000 turns, producing a magnetic flux density of $16\text{x}10^{-5}$T along its axis. If its turns are pressed to form a circular coil of diameter 10cm. **Calculate** the magnetic flux density at the center of the circular coil. $\mu_{air} = 4\pi\text{x}10^{-7}$ Wb/Amp.m



.....

.....

.....

.....

.....

.....

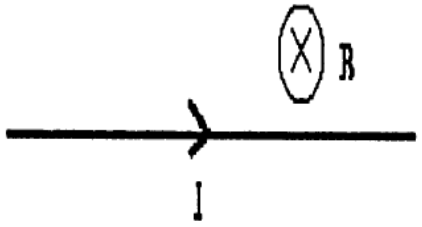
.....

.....

.....

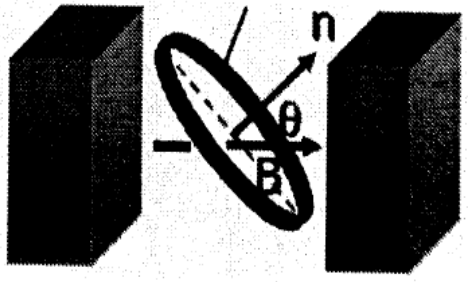
59)

Suppose a very long straight wire of mass 40gm with length 20cm is immersed in a constant magnetic field B=5T. **What** current would be required so that the wire will be suspended, knowing that $g=10m/s^2$



60)

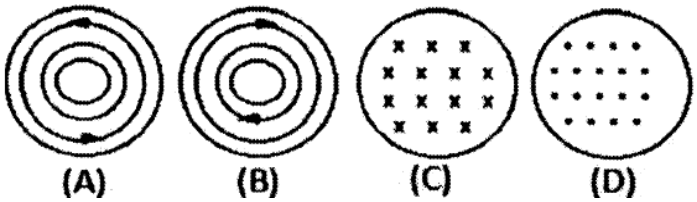
A 200 turn coil of wire has a radius of 20cm and the normal to the area makes an angle of 30° with a 3mT field. **What** is the torque on the loop if the current is 3A? Then **find** the magnetic dipole moment when the torque maximum.

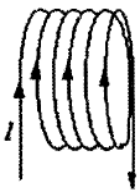


61)

Choose the correct answer:

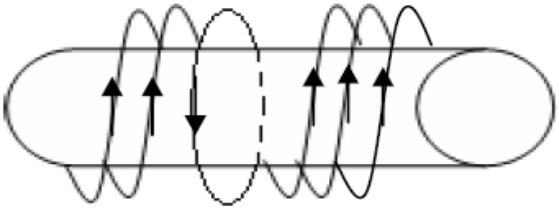
A long wire that carries a current I is bent into five loops as shown in the figure. If the observer could "see" the magnetic field inside this arrangement of loops, how would it appear from that position he is looking from?





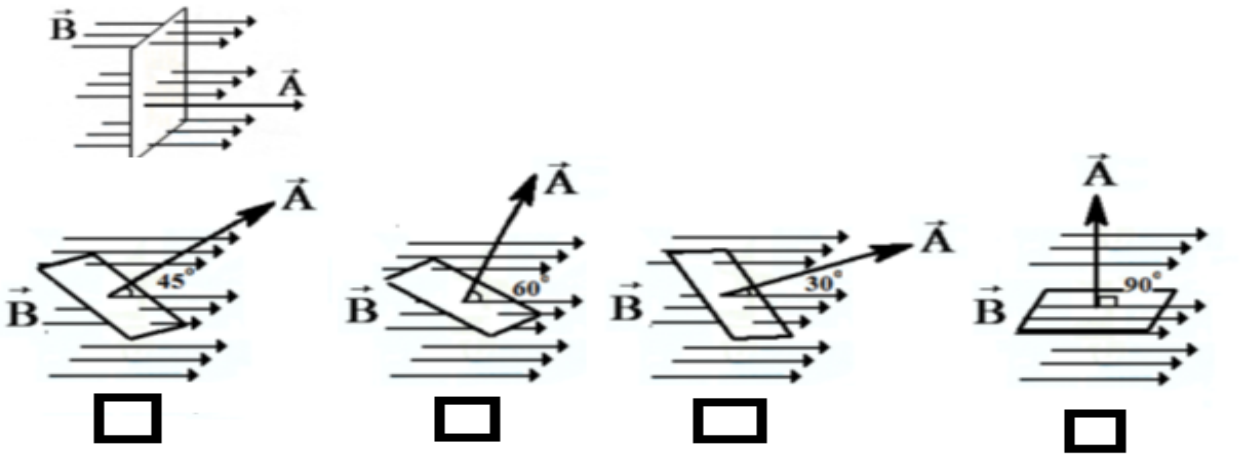
……
……
……
……
……

62) In the following figure .. straight wire wounded as circular coil of 3 turns and radius 1 cm and carry a current 5 A . placed normal to axis of solenoid of length 10 cm contain 5 turns and carry 3 A as shown in figure . find total magnetic flux density at center of circular coil



……
……
……
……
……
……
……

63) Knowing that magnetic flux cutting the coil as in figure = φ . which figure indicate flux equal φ/2 cut this coil

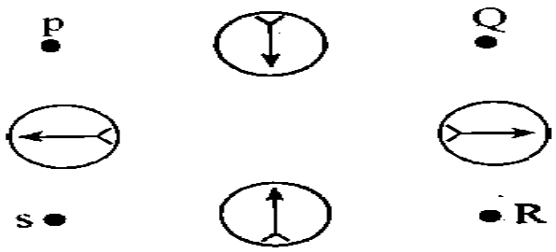


64) A solenoid of length L and cross sectional area A . connected to D.c source . flux cut it become φ . when remove half this solenoid and re-connect it to same battery . flux at this case becomes

$\frac{\phi}{2}$ $\frac{\phi}{4}$

2ϕ ϕ

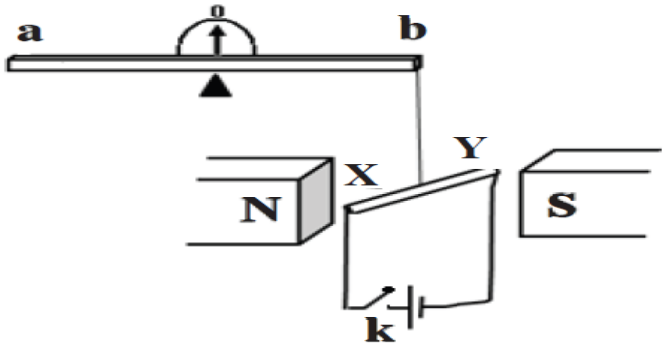
65) in the following figure . 4 wires carry a current normal to page .in compass needle show these deflections around each wire … which choice describe true direction of current in wires



66)

	Current in wires normal downward	Current in wires normal upward
A	**Wire R and Q**	**Wire P and S**
B	**Wire R and S**	**Wire P and Q**
C	**Wire Q and S**	**Wire P and R**
D	**Wire P and R**	**Wire Q and S**

67) The figure below shows a rod **(X ,Y)** with length **(0.16 m)** suspended by a scale **(a,b)**. The rod is connected with a battery and put inside a perpendicular magnetic field of **(0.4 T)**. The scale **(a,b)** is at equilibrium when switch **(k)** is open.



After switch **(k)** is closed, a current of **(8.5A)** flows through the rod **(X , Y)**.

a- At which point, **(a)** or **(b)** does a mass **(m)** have to be added in order to make the scale at equilibrium?

b- Calculate the magnitude of the mass **(m)**.

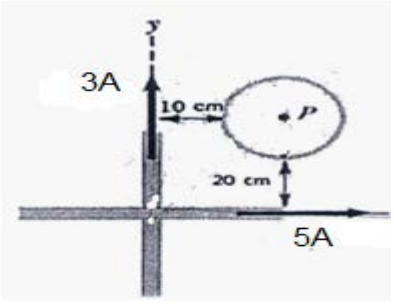
68) A sensitive galvanometer of resistance **50Ω** is converted into ammeter and the following table gives the relation between the used shunt **(R_s)** and the current passing through it **(I_s)** at maximum deflection of the pointer.

R_S (Ω)	0.01	0.02	0.03	0.04	0.05	0.1
I_s (A)	10	5	$\frac{10}{3}$	2.5	2	1

a) **Represent (R_S) on y-axis and $\frac{1}{I_s}$ on x-axis.**
b) **From the graph find** the maximum current measured by the sensitive galvanometer **(I_g)**
c) **Find** the maximum current measured by the ammeter when the galvanometer is connected to a shunt **0.01Ω.**

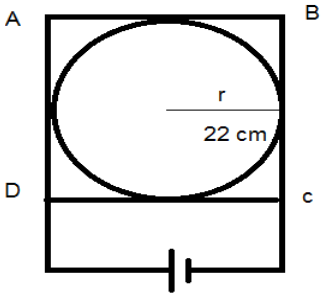
.....
.....
.....
.....
.....

69- In the shown figure, find the value and direction of the current passing through the coil whose number of turns $\frac{100}{\pi}$ radius is 20cm which makes the magnetic needle shows no deflection at the point (P). If the current in the coil is reversed, calculate the net magnetic field at the point (P). ($\mu = 4\pi \times 10^{-7}$ wb/Amp.m).



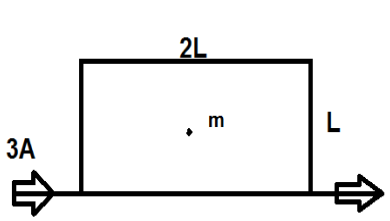
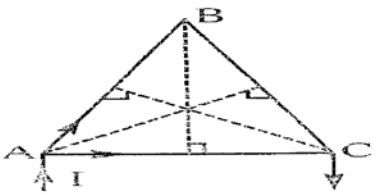
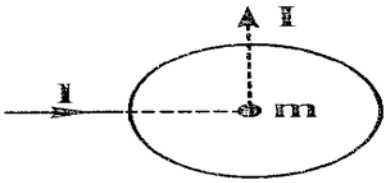
.....
.....
.....
.....
.....

70-**a circular coil of diameter 44 cm , turns = 7 turns .carry a current = ½ current of battery .there is a square coil tangent to the coil (a b c d) where resistance of each side = 10 ohm .calculate : total magnetic flux density at center of circular coil knowing that emf of battery = 32 volt and has internal resistance =o.5 ohm**



.....
.....
.....
.....
.....
.....

71- **In the following figure : proof that (m) is a neutral point .**

A) 	
B) 	
C) 	

72) **A straight wire of length 20 cm . reformed as circular coil . carrying 4 A . calculate magnetic flux at its center.**

.....

.....

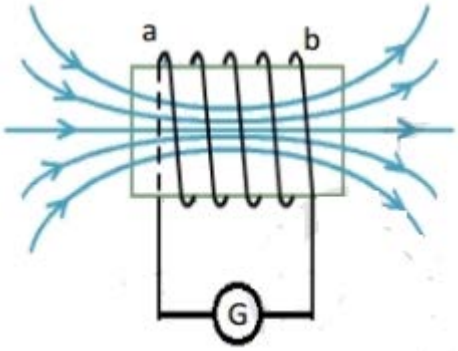
.....

.....

.....

73. ***Second: In the opposite figure:-***

If number of turns 50 in coil have magnetic flux 0.3 web, if flux increase to 0.4 web through 0.1 sec.



Calculate: 1- Induced emf in coil

2- Direction of induced emf of coil between point a & b.

.....

.....

.....

.....

.....

.....

74. ***Complete the table with value of R_x needed to calibrate micro ammeter scale to be ohmmeter:-***

Reading of micro ammeter (μA)	300	150	100	75
Value of R_x	0	3000	……	…….

And, if resistance of micro ammeter is 50Ω, what is the value of calibrated resistance used?

……

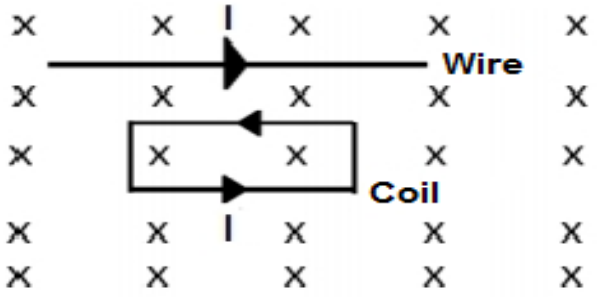
……

……

……

……

75. **If direction of magnetic field is into the page:-**



1- Find direction of force acting on straight wire placed perpendicular to magnetic field.

2- Calculate the affected torque on coil placed in magnetic field on plane of page.

……

……

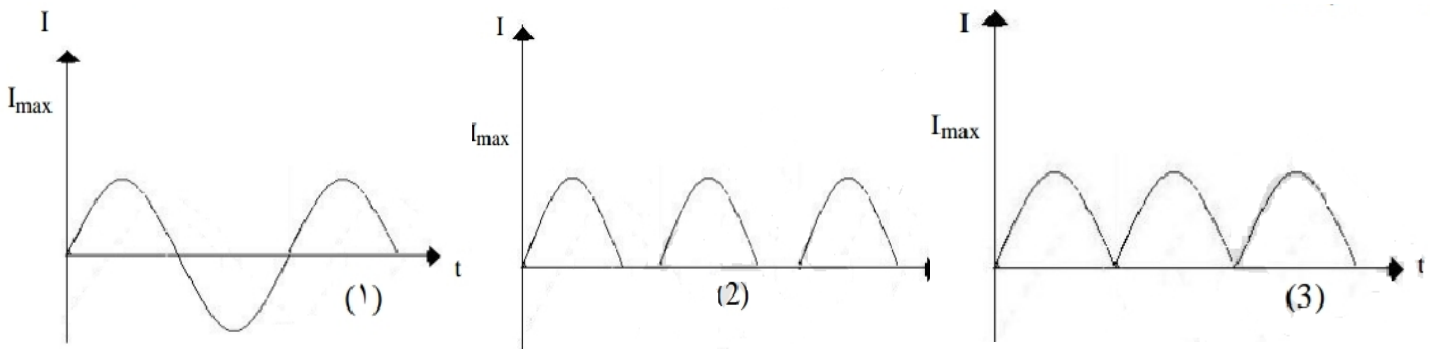
……

……

……

76. ***In the shown figure:-***

Number (1) represent current intensity resulted from dynamo and time.



1- How to obtain current as shown in (2)?

2- How to obtain current as shown in (3)?

……

……

……

……

……

77. **un-negligible resistance circular loop connect to battery of negligible internal resistance.**
a. What will happen to the magnetic field intensity at its center if the number of loops is doubled and the battery replaced with another one of double electromotive force?
b. Mention the reason for your answer.
c. Mention two units to measure the magnetic field intensity.
……
……
……
……
……

78. Galvanometer has coil of **400** loop and cross sectional area **4 cm^2.** And its permanent magnet is replaced with circular coil of **500** loop and radius **3cm,** and carry current of **2A. ($\mu=4\pi x10^{-7}$)**
a. What is the magnetic field intensity that affect on its coil.
b. Find the torque of spiral springs in the galvanometer at the moment of measuring current intensity **3 mill ampere.**
c. If we compare torque of spiral spring to torque of galvanometer coil in this case, then
* Torque of spiral spring is greater than torque of galvanometer coil
* Torque of spiral spring is smaller than torque of galvanometer coil
* Torque of spiral spring is equal to torque of galvanometer coil
* Torque of spiral spring is not related to torque of galvanometer coil
……
……
……
……
……
……
……
……
……

79. A circular coil is connected to a battery of negligible internal resistance. If a half of the coil turns is removed away and the remainder half is reconnected to the same battery, **what change has** happened to the density of magnetic flux at its center ?
……
……
……
……
……

80. Two long parallel wires, through each an equal current **(I)** passes, and have a normal distance between them **(d).** The table below records the mutual magnetic force per unit length **(F)** of the wire and the reciprocal of the normal distance between them **($\frac{1}{d}$).**

F (N/m)	0.8×10^{-5}	1.6×10^{-5}	2×10^{-5}	4×10^{-5}	8×10^{-5}
$(m^{-1})\ \frac{1}{d}$	10	20	25	50	100

First: Plot the graphical relation between **(F)** on y-axis, and **($\frac{1}{d}$) on x-axis.**

Second: From the graph find: the current intensity **(I)** passing through each wire. **($\mu = 4\pi x10^{-7}$ Wb/A.m)**

81. A sensitive galvanometer has a coil of resistance **40Ω** and its pointer deflects to full scale by a current of **5×10^{-3}A.** A shunt resistance **(Rs)** is connected to it to be converted into an ammeter measuring a current of maximum **1A. Calculate** the total resistance of the ammeter.

……

……

……

……

……

82. A straight wire is coiled as a circular coil of **5 turns.** An electric current of intensity **(I)** has passed through it to produce magnetic flux of density **(B_1)** at its centre. The wire is recoiled another time as one circular turn and the same current intensity is passed through it. The magnetic flux density at its center becomes **(B_2). Find the ratio: $\frac{B_1}{B_2}$**

……

……

……

……

……

83. A solenoid carries an electric current. What would happen to the magnetic flux density at a point on its axis inside it when the spacing between its turns are reduced to half **(keeping the cross-sectional area and the current intensity unchanged).**

……

……

……

……

……

……

……

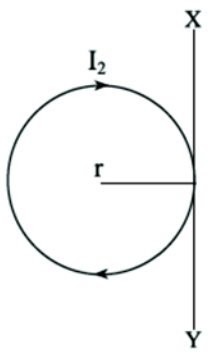
……

84. Choose the correct answer:

In the figure shown, a long straight wire carrying current (I_1) is placed tangent to circular ring of radius (r) and a current (I_2) passing through it in the direction shown.

When the nutral point formed at the center of the ring, which of the following choices represents the ratio ($\frac{I_1}{I_2}$) and the direction of the current I_1.

Choices	The ratio $\frac{I_1}{I_2}$ and the direction of I_1
a)	π upward
b)	π downward
c)	1/ π upward
d)	1/ π downward



85. A moving coil galvanometer has resistance 45Ω When the galvanometer is connected to shunt resistor, the intensity of the current passing through the coil of the galvanometer becomes 0.1 of the total current. Find the value of the shunt (R_S).

.....

.....

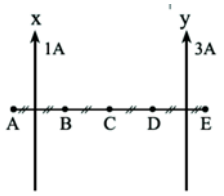
.....

.....

.....

86. Two parallel long wires carry a current of 1A and 3A in the direction as shown in figure.

At which point A, B, C, D or E is neutral point.



.....

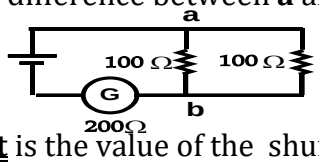
.....

.....

.....

.....

87. At connecting galvanometer (G) its resistance **200Ω** in an electric circuit contains two resistors each one of them is **100Ω** and battery of negligible internal resistance as shown in the figure, its pointer deflects to full scale deflection. If you know that the potential difference between **a** and **b** is **1V, Calculate:**



a) The maximum reading of the galvanometer's scale.

b) The electromotive force of the battery.

c) If we want to increase the rang of such galvanometer to be **1A, What** is the value of the shunt resistance that must connect with it .

.....

.....

.....

.....

.....

88. A galvanometer of resistance equal R_g, connected to $R_m=3R_g$. Measured max voltage in this case $=V_1$

If R_m replaced by $11R_g$, mx voltage measured becomes V_2.

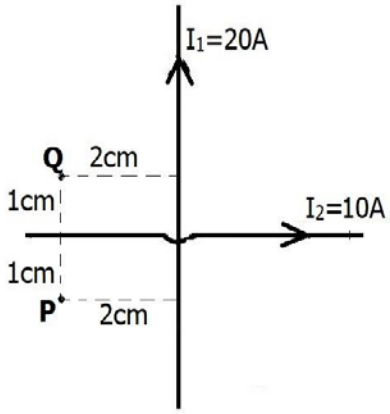
Find ratio V_2/V_1.

.....

.....

.....

89. two insulated perpendicular wires in the plane of paper, they are carrying currents as shown in figure, calculate the magnetic flux density at the two points (P & Q) in same paper plane. [μ=4π×10-7 Wb/A.m]



.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

90.A coil of 500 turns carries an electric current of intensity (I) ampere and its plane is parallel to uniform magnetic flux of density 0.1 tesla**.**

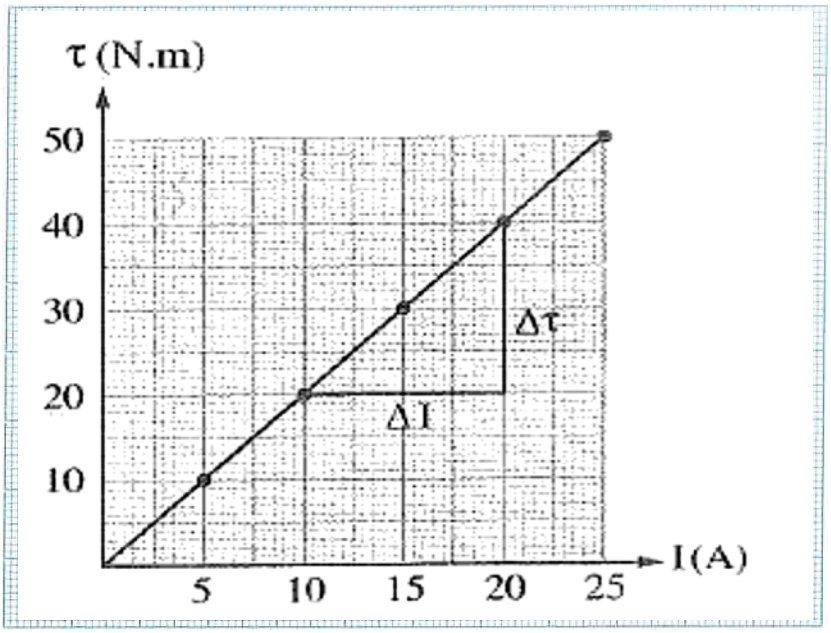
The table below records the torque (T) acting on the coil and the current intensity (I) passing through it:

τ (N.m)	10	20	30	40	50
I (A)	5	10	15	20	25

First: **Plot** the graphical relation between (x) on the vertical axis and (I) on the horizontal axis.

Second : **Use** the slope of the line obtained to find the cross-sectional area of the coil.

First:



Second :

Slope of line = $\frac{\Delta \tau}{\Delta I}$ = 40-20 \ 20-10 = 2

Slope = BAN

A = $\frac{2}{0.1 \times 500}$ = 0.04 m^2

91.Mention one role for the shunt:

To extend the range or measuring tire current intensity.

Or : To allow most of the circuit current to pass through it. and protect Galvanometer from high current, able us to measure big current

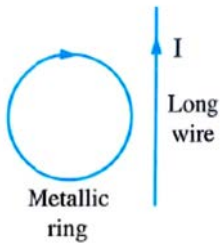
Or : To lower the total resistance of the device so that it does not affect the current of the circuit.

92.Mention one role for the variable resistor in the ohmmeter.

To adjust the pointer at zero position of the resistance scale when the ohmmeter is short circuited. and protect Galvanometer from high current.

93.Choose the correct answer:

During the movement of a metal ring whose plane is in the plane of the page, an electric current is induced through it as shown in the figure**.**



The direction in which the ring has been moved is towards ……..

(a) the top of the page, parallel to the wire

(b) the bottom of the page, parallel to the wire

(c) the right of the page, perpendicular to the wire

(d) the left of the page, perpendicular to the wire

Ans → (c) the right of the page, perpendicular to the wire

94.Give reason for :

The coil of the galvanometer is attached to a pair spiral springs. (two points are required).

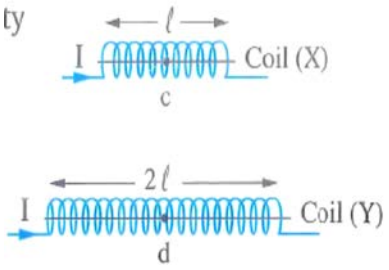
1. Serve as current leads**,**(in and out for current)
2. Restrain the rotational motion of the coil**.**(make torque)
3. Restore the coil to zero position after turning the current off.

95. What are the consequences of connecting a multiplier to a galvanometer when converted into voltmeter? (two points are required)

1. Extends the measuring range of die potential difference**.**
2 **.**Increases the total resistance of the device**.**
3. To make the voltmeter draw a negligible current.
4. Increases the accuracy of measuring the potential difference.

96.Choose the correct answer :

In the given figure, two coils (X) and (Y) whose number of turns are (n) and (2n) respectively. A current of intensity (I) passes through each of them. The relation between the magnetic flux density (B_1) at the point (c) on the axis of the coil (X) and (B_2) at the point (d) on the ax is of the coil (Y) is ……



a) $B_2 = 2\ B_1$ b) $B_2 = B1$

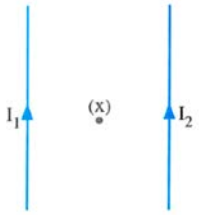
c) $B_2 = \frac{B_1}{4}$ d) $B_2 = \frac{B_1}{4}$

Ans: b) $B_2=B_1$ (due to N/L = 2N/2L)

97. Two parallel long straight wires carry electric currents of different intensities as shown in figure. **What happens to** each of the following quantities when the direction of the electric current is changed in one of them**:**

First: The magnetic flux density at the point (x) ?

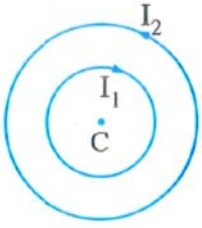
Second : The magnitude of the mutual force between the two wires ?



Frist : the magnetic flux density increases at the point (X).(B = B1+B2)

Second : The magnitude of the mutual force between the wires does not change.(F =ɲ $I_1I_2L\backslash 2\pi d$)

98. Two concentric metal rings in one plane carry electric currents as shown. The diameter of one ring is double that of the other ring**.** The relation between the current intensities that makes the magnetic flux density at the common center = zero, is …….



a) $I_1 = \frac{I_2}{2}$ b) $I_1 = I_2$

c) $I_1 = 2\ I_2$ d) $I_1 = 4\ I_2$

99.A galvanometer has coil resistance 60 Ω. **Calculate** the resistance of the shunt that reduces its sensitivity to and fifth ($\frac{1}{5}$) **Then calculate** the total resistance of the ammeter.

$R_s = \frac{I_g R_g}{I - I_g}$

$I = 5\ I_g$

$R_s = \frac{60\ I_g}{4\ I_g} = 15\ \Omega$

$R_{aq} = \frac{60 \times 15}{60+15} = \frac{600}{75} = 12\ \Omega$

100.Give reasons for :

A) The ohmmeter scale is opposite to the scale of the current and it is not uniform (not linear).

The ohmmeter scale is opposite to the scale of the current because the current in the ohmmeter circuit is inversely proportional to the total resistance in its circuit**.**

(ANS) Not uniform : Because the current in the ohmmeter is not inversely proportional to the measured resistance (R_x)**.** It's inversely with total Resistance

(B) The torque acting on a rectangular coil carrying a constant electric. current changes as the position of the coil in a uniform magnetic field changes, whereas the magnetic dipole moment of the coil does not change.

(Ans) Magnetic torque acting on a rectangular coil carrying an electric current in a uniform magnetic field : $\tau = BINA \sin \theta$
Magnetic torque depends on the value of the angle (θ).
Whereas the magnetic dipole moment of the coil = IAN
Therefore, it is independent on the angle between the coil plane and the direction of magnetic field.

101.Mention one factor affecting :

A) The magnetic flux density at the center of a circular coil carrying an electric current.

(ANS) Number of turns in the coil **Or**, current intensity through the coil **Or**, the coil radius **Or**, the coil diameter **Or**, permeability of the coil core

B) The magnitude of the force acting on a straight wire carrying an electric current and placed perpendicular to the direction of a magnetic field.

(ANS) Current intensity through the wire. **Or,** magnetic flux density affecting the wire.
Or length of wire exposed to the magnetic flux.

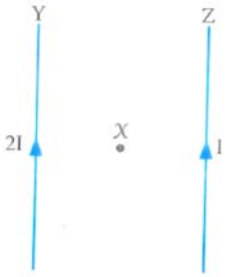
102. A) A solenoid is connected to a battery in a closed circuit**.**
What is the effect of compressing its turns regularly with respect to the magnetic flux density at a point on its axis inside it? **Explain your answer.**

(Ans) The magnetic flux density at a point on its axis inside increase. Because $B \propto \frac{1}{\ell}$. There is a decrease in the coil length while the other factors remained unchanged.

B) **Give reasons for :** The magnet used in the moving coil galvanometer has concave poles.

(ANS) The magnetic flux lines are radially directed. **Or,** the magnetic flux density is constant. **Or,** The magnetic flux is always parallel to coil plane**,** so the torque **Or** (the pointer deflection) is proportional to the current intensity in the coil.

103. Two parallel long straight wires (Y and Z), through each an electric current pass as shown in the opposite figure. **What happens to** the magnetic flux density at the point (X) when moving the wire (Z) away from the wire (Y) ?



(ANS) Magnetic flux density at the point (x) increases.($B_x = B_y - B_z$)

104.A galvanometer of coil resistance 40 Ω measures current intensity of maximum 20 mA. **Calculate** the maximum potential difference that can be measured after connecting a multiplier of 960 Ω to its coil.

(ANS) $V = I_g (R_g + R_m)$

$= 20 \times 10^{-3} \times (40 + 960) = 20$ V

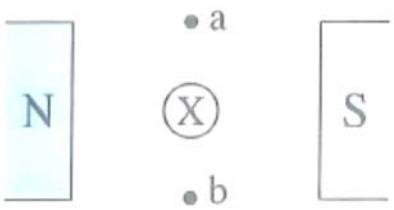
Another Solution:

$R_m = \frac{V - V_g}{I_g}$

$960 = \frac{V - (40 \times 20 \times 10^{-3})}{20 \times 10^{-3}}$

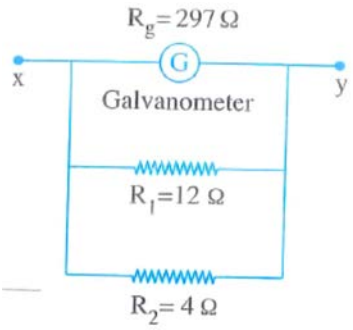
V = 20 V

105. The figure illustrates a straight wire carrying an electric current into the page and placed between two magnetic poles. **Determine** the point (a or b) at which the magnetic flux density is greater.



(ANS) The magnetic flux density is greater at the point (a) (at a 2 field same direction)

106. The diagram (between the two points x and y) shows the internal structure of an ammeter**. Use the data given on the diagram to calculate** the current intensity measured by the ammeter as a current of 10 mA passes through the galvanometer.



(ANS)

$R_s = \frac{12 \times 4}{12 + 4} = 3\ \Omega$

$R_s = \frac{I_g R_g}{I - I_g}$

$3 = \frac{10 \times 10^{-3} \times 297}{I - (10 \times 10^{-3})}$

$I = 1\ A$

Another Solution

$V_g = 0.01 \times 297 = 2.97\ V$

$R_s = \frac{12 \times 4}{12 + 4} = 3\ \Omega$

$I_s = \frac{V_g}{R_s} = \frac{2.97}{3} = 0.99\ A$

$I = I_s + I_g = 0.99 + 0.01 = 1A$

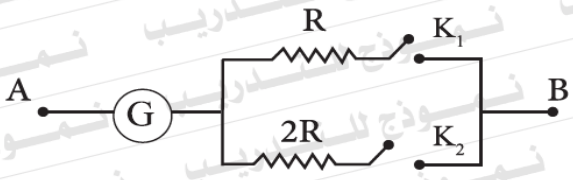
107.

6- The figure shows a galvanometer that can be converted into a voltmeter when closing any of the switches (K_1) or (K_2).

In which case (closing K_1 or K_2) the voltmeter AB is able to measure a higher potential difference?

(٦) يبين الشكل جلفانومتر يمكن تحويله إلى فولتميتر عند غلق أيٍّ من المفتاحين (K_1) أو (K_2) .

في أي الحالتين (غلق K_1 أو غلق K_2) يمكن للفولتميتر AB قياس فرق جهد أعلى؟



(ANS) Close k_2

108.

(a) Compare between: | (أ) قارن بين:

Point of comparison وجه المقارنة	Ampere's right hand rule قاعدة أمبير لليد اليمنى	Fleming's left hand rule قاعدة فلمنج لليد اليسرى

Ampere right hand rule	Fleming left hand rule
Determine direction of magnetic field around straight conductor carrying a current	determine the **direction of magnetic force** acting on straight conductor carrying current and placed normal to magnetic field.

(b) Two long parallel straight wires carry electric currents of different intensities. Compare the location of the neutral point when the currents flow : | (ب) سلكان مستقيمان طويلان ومتوازيان يحملان تيارين كهربيين مختلفي الشدة. قارن موضع نقطة التعادل عندما يمر التياران:

Point of comparison وجه المقارنة	In one direction في اتجاه واحد	In opposite directions في اتجاهين متضادين

One direction	Opposite direction
Between two wire	Outside near the weakest wire.

109.

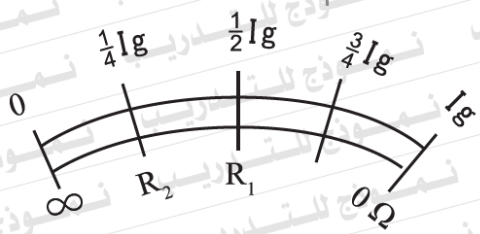
- Choose the correct answer:

The diagram shows the scale of an ohmmeter. What is the relation between the value of R_1 and the value of R_2 on the ohmmeter scale?

(٢٣) اختر الإجابة الصحيحة:

يبين الشكل تدريج جهاز الأوميتر.

ما العلاقة بين القيمة (R_1) والقيمة (R_2) على تدريج الجهاز؟



(a) $R_2 = {}^1/_2\ R_1$

(b) $R_2 = 2\ R_1$

(c) $R_2 = 3\ R_1$

(d) $R_2 = 4\ R_1$

110. **(a) Mention one factor affecting:**
The magnetic dipole moment of a coil.

(ANS) (friction –spring toque-I-A-N)

111. - A solenoid is of length 0.5 m, 400 turns and cross sectional area 0.001 m^2. It carries an electric current of intensity 2A. Given that the permeability of air is $4\pi\times10^{-7}$ Wb/A.m, **Calculate:**

First : The magnetic flux density at a point on its axis inside it.

Second : The coefficient of self induction of the coil.

(٢٧) ملف لولبي طوله 0.5m وعدد لفاته 400 لفة ومساحة مقطعه $0.001\ m^2$ ويمر به تيار كهربي شدته 2A. علمًا بأن معامل نفاذية الهواء $4\pi\times10^{-7}$ Wb/A.m، احسب:

أولا: كثافة الفيض المغناطيسي عند نقطة على محوره بداخله.

ثانيًا: معامل الحث الذاتي للملف.

(ANS) $B=4\pi x10^{-7} x400x2\backslash 0.5 = 2.010x10^{-3}T$

$L= 4\pi x10^{-7} x (400)^2 x0.001 \backslash 0.5 = 4.021x10^{-4}H$

112.

(a) A rectangular coil of length (ℓ_1) and width (ℓ_2) carries an electric current of intensity (I) and placed parallel to magnetic flux of density (B). Express by an equation the force acting on :

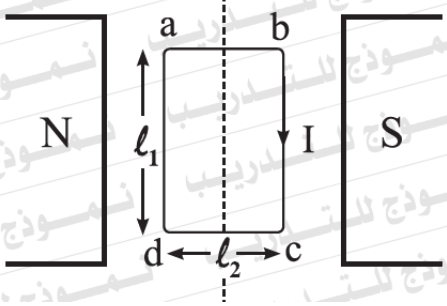
First : The side ab.

Second : The side bc.

(أ) في الشكل ملف مستطيل طوله (ℓ_1) وعرضه (ℓ_2) يمر به تيار كهربي شدته (I) موضوع موازيا لمجال مغناطيسي كثافة فيضه (B) . عبر بالمعادلة عن القوة التي تؤثر على :

أولاً: الضلع ab

ثانياً: الضلع bc



(Ans)

First force on side ab =zero

$F=BILSIN\theta=0$

Second force on side bc=max

$F=BILSIN90=BIL_2$

113.

(b) Give reason for: The galvanometer scale is uniform and its zero is at the middle.	(ب) علل : تدريج الجلفانومتر منتظم، وصفر التدريج في المنتصف.

(Ans)

As θ α I & scale is uniformly divided.

To determine direction of current so it able to rotate clock wise or anti clock wise.

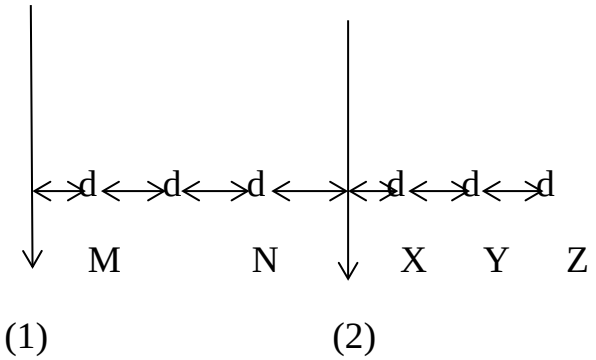
114.

44- A circular coil consists of 14 turns, the radius of each turn is 0.11 m. Calculate the electric current intensity that passes in the coil to produce magnetic flux of density $8x10^{-4}$ T at its center, (Given that the permeability of air is $4\pi \times 10^{-7}$ Wb/A.m) and $(\pi = \frac{22}{7})$.	(٤٤) ملف دائري يتكون من 14 لفة، نصف قطر كل منها 0.11m . احسب: شدة التيار الكهربي الذى إذا مر بالملف أنتج فيضًا مغناطيسيًا كثافته 8×10^{-4} T عند مركزه (علمًا بأن معامل نفاذية الهواء $4\pi \times 10^{-7}$ Wb/A.m، $(\pi = \frac{22}{7})$.

(ANS) $I=(8x10^{-4} \times 2x\ 0.11)/4\pi\ x10^{-7}x14=10A$

115. In the following circuit figure knowing that N is N.P

A) When I is reversed in wire (2) the N.P becomes in (M,X,Y,Z)
B) When I is reversed in wire (1) the N.P becomes in (M,X,Y,Z)



116. Choose the correct answer:

A magnet of flat poles is not used in the galvanometer since they make the magnetic flux density, in the space in which the coil rotates, always:

A. vary as the coil rotates.
B. constant as the coil rotates.
C. perpendicular to the coil plane.
D. parallel to the coil plane.

Ans

(D)Parallel to the coil plane

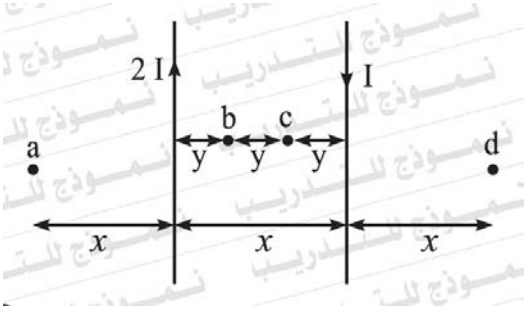
---

117. Choose the correct answer:

Two long parallel wires carry two electric currents in opposite directions =

At which point in this diagram, the total magnetic flux density produced by the two currents vanish?

A. Point a
B. Point b
C. Point c
D. Point d



Ans

(D) Point d

118. A galvanometer of coil resistance 200Ω whose pointer deflects to full scale when a current of intensity 5 mA passes through its coil. Calculate the shunt resistance to be connected to the galvanometer to convert it into an ammeter of full scale 1A.

Ans

$R_g = 200\ \Omega$ $I_g = 5 \times 10^{-3}\ A$

$I_t = 1\ A$ $R_s = \frac{Vg}{I - Ig} = \frac{5 \times 10^{-3}}{1 - 5 \times 10^{-3}} = 1.005\Omega$

---

119. Choose to answer (a) or (b).

(a) Mention one factor affecting: the magnetic flux density at the center of a circular coil carrying an electric current.

(b) Mention one factor affecting: the magnetic dipole moment of a coil.

Ans

(a) $B=\frac{MNI}{2r}$

B α N B α I B $\alpha\frac{1}{r}$

(b) m.d = IAN

m.d α I m.d α A m.d α N

---

120. Give reasons for:

In order to use the galvanometer to measure high potential difference, a high resistance should be connected to its coil in series.

Ans:

To make R_m that connect with series with galvanometer take high potential difference to increase the range of galvanometer. (R α V)

121. Give reasons for:

In order to use the galvanometer to measure high potential difference, a high resistance should be connected to its coil in series.

Ans:

To make R_m that connect with series with galvanometer take high potential difference to increase the range of galvanometer. (R α V)

122. A milli-ammeter of resistance 5Ω has full scale reading of 15 mA. It would be converted into an ohmmeter by using an electric cell having an electromotive force 1.5 V and internal resistance 1Ω.

Calculate the standard resistance required to make the pointer deflect to the zero position of the ohmmeter.

Ans

$R_g = 5\ \Omega$ $I_g = 15 \times 10^{-3}$ A

$r = 1\ \Omega$ $VB = 1.5\ V$

$I_g = \frac{VB}{R_{app}} = \frac{1.5}{R_{app}} = 15 \times 10^{-3}$

$R_{app} = 100\ \Omega$

$R_{app} = R_{standard} + r + R_g$

$100 = R_{standard} + 1 + 5$

$R_{standard} = 94\ \Omega$

---

123. Ohmmeter connected to R_{X1}, and its pointer deflect to 1/3 its graduation. If connected to R_{x2} the pointer deflects to 1/9 its graduation. Find $\frac{R_{X1}}{R_{X2}}$