PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

MAGNETIC EFFECTS OF ELECTRIC CURRENT

Mcq

1. The strength of the magnetic field in a long solenoid having 5000 turns per meter is $3.14x10^{-2}T$. The current flowing through the solenoid is

A. $2A$

B. $3A$

C. $4A$

D. $5A$

Answer: D

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2. A long solenoid carrying a current produces a magnetic field B along its axis. If the number ofturns per cm is doubled and the current in the solenoid is halved, then the new value of the magnetic field along its axis will be

A. $2B$

B. $\frac{B}{2}$

C. B

D. $4B$

Answer: C

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3. A straight wire of length 1 m, and carrying a current of 1.8 A, is placed in a uniform magnetic field of induction 2T. If the magntic field is perpendicular to the length of the wire, then the force acting on the wire is

A. $1.8N$

B. $3.6N$

C. $0.9N$

D. $2.5N$

Answer: B

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4. A charged particle of charge q moving with the velocity v, enters along the axis of a solenoid carrying a current. If B is the magnetic induction along the axis of the solenoid then the force acting on the charged particle will be

A. qvB

B. less then qvB

C. $zero$

D. more than qvB

Answer: C

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5. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new vlaue of the magnetic field is

A. $4B$

B. $2B$

C. $\frac{3B}{2}$

D. $\frac{B}{2}$

Answer: C

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6. A long wire carries a steady curent . It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be

A. nB

B. $2nB$

C. n^2B

D. $\frac{B}{n^2}$

Answer: C

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7. If a particle of charge 10^{-12} coulomb moving along the $\hat{x}$-direction with a velocity $10^5 m/s$ experiences a force of 10^{-10}

newton in $\hat{y}$-direction due to magnetic field. Then the minimum magnetic field is

A. $5 \times 10^{-3} Wb/m^2$

B. $10^{-5} Wb/m^2$

C. $2 \times 10^{-3} Wb/m^2$

D. $10^{-3} Wb/m^2$

Answer: D

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8. A straight wire of diameter 0.4 mm carrying a current of 2A is replaced by another wire of 0.8 mm diameter and carrying the same current. The magnetic field at the same distance from the wire is

A. one half of the first value

B. twice the first value

C. not changed

D. thrice the first value

Answer: C

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9. A long solenoid has 800 turns per meter length of solenoid. What is the magnatic induction at the end of the solenoid if it carries a current of 2.5 A?

A. $6.28 \times 10^{-4} Wb/m^2$

B. $1.256 \times 10^{-3} Wb/m^2$

C. $3.14 \times 10^{-4} Wb/m^2$

D. $5 \times 10^{-4} Wb/m^2$

Answer: B

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10. A solenoid is 2 m long and 4 cm in diameter. It has 4 layers of windings of 1000 turns each and carries a current of 5 A. What is the magnetic field at the center of the solenoid?

A. $10^{-3} T$

B. $2\pi \times 10^{-3} T$

C. $4\pi \times 10^{-3} T$

D. $8\pi \times 10^{-3} T$

Answer: C

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11. A current of 2 A flows in an air core solenoid of length 1 m and number of turns 1000. What is the magnetic flux density inside the solenoid?

A. $8\pi \times 10^{-5}T$

B. $8\pi \times 10^{-4}T$

C. $4\pi \times 10^{-4}T$

D. $3\pi \times 10^{-4}T$

Answer: B

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12. A long solenoid of length L has a mean diameter D. It has n layers of windings of N turns each. If it carries a current 'i' the magnetic field at its centre will be

A. directly proportional to D

B. inversely proportional to D^2

C. directly prportional to length (L)

D. `independent of the diameter D

Answer: D

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13. Six wires carry currents $I_1 = IA, I_2 = 2A, I_3 = 3A, I_4 = 1A, I_5 = 4A$ and $I_6 = 5A$

. They cut the page perpendicularly at points 1,2,3,4,5 and 6. What is the value of the line intefral of vecB around the closed path i.e phivecB . Dvecl ?

A. $zero$

B. $4\mu c_0 Wb/m$

C. $2\mu_0 Wb/m$

D. $\mu_0 Wb/m$

Answer: D

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14. A vertical straight conductor carries a current vertically upwards. A point P lies to the east of it at a small distance

and another point Q lies to the west at the same distance. The magnetic field at P is

A. Less than at Q

B. Greater or less that at Q depending upon the strength of the currrent

C. Greater than at Q

D. The same as at Q

Answer: D

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15. Five very long insulated straight wires are bound together to form a small cable. Currentys carried by the wires are $I_1 = 20A, I_2 = -5A, I_3 = 10A, I_4 = +7A$ and $I_5 = -12A$

. What is the magnetic induction at a perpendicular distance of 5 cm from the cable?

A. $60\mu T$

B. $70\mu T$

C. $75\mu T$

D. $80\mu T$

Answer: D

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16. The magnetic induction due to toroidal solenoid is independent of

A. permeability

B. current

C. radius of the toroidal solenoid

D. number of turns per unit length

Answer: C

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17. A current of 1.6 A flows through a long solenoid, having 8 turns/cm. The magnetic induction at the end of the solenoid along its axis is

A. $12 \times 10^{-4} T$

B. $16x10^{-4} T$

C. $6 \times 10^{-4} T$

D. $8 \times 10^{-4} T$

Answer: D

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18. Toroid is a

A. rectangular shaped solenoid

B. ring shaped solenoid

C. rectangular shaped solenoid

D. ring shaped open solenoid

Answer: B

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19. If a current is passed through a spring then the spring will

A. it is compressed

B. it gets expanded

C. it performs a verticle S.H.M.

D. remains unchaged

Answer: A

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20. A straight section PQ of a circuit lise along the X-axis from $x = -\frac{a}{2}$ to $x = \frac{a}{2}$ and carriers a steady current i. The magnetic field due to the section PQ at a point $X = +a$ will be

A. proportional to l/a

B. zero

C. proportional to a

D. proportional to a^2

Answer: B

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21. A long solenoid has $200 turns per cm$ and carries a current i. The magnetic field at its centre is $6.28 \times 10^{-2} weber / cm^2$. Another long soloenoid has $100 turns per cm$ and it carries a current $\frac{i}{3}$. The value of the magnetic field at its centre is

A. $1.05 \times 10^{-3} Wb / m^2$

B. $1.05 \times 10^{-4} Wb/m^2$

C. $1.05 \times 10^{-2} Wb/m^2$

D. $1.05 \times 10^{-5} Wb/m^2$

Answer: C

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22. An electron is moving with the velocity of $10^7 \frac{m}{s}$, parallel to a straight wire, carrying a current of 10 A. What is the force acting on the electron, if the electron is at a distance of 4 cm from the wire ?

A. $8 \times 10^{-17} N$

B. $6 \times 10^{-16} N$

C. $5 \times 10^{-17} N$

D. $3 \times 10^{-17} N$

Answer: A

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23. The wire loop ABCDEA formed by joining two semicircular loops of radiiR_1 and R_2carries a current I. What is the magnetic induction at the center O in the following figure?

A. $\frac{\mu_0 i}{4}\left(\frac{1}{R^1}-\frac{1}{R^2}\right)$

B. $\frac{\mu_0 i}{4}\left(R^2-R^2\right)$

C. $\frac{\mu_0 i}{4}\left(R^2+R^2\right)$

D. $\frac{\mu_0 i}{4}\left(\frac{1}{R^2}-\frac{1}{R^2}\right)$

Answer: D

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24. A winding wire which is used to prepare a solenoid of length 80 cm can bear a maximum current of 10 A. The cross sectional radius of the solenoid is 3 cm. What should be the length of the winding wire if a magnetic field of 0.2 T is to be produced at the solenoid along its axis ?

A. $6 \times 10^3 m$

B. $1.2 \times 10^2 m$

C. $4.8 \times 10^2 m$

D. $2.4 \times 10^3 m$

Answer: D

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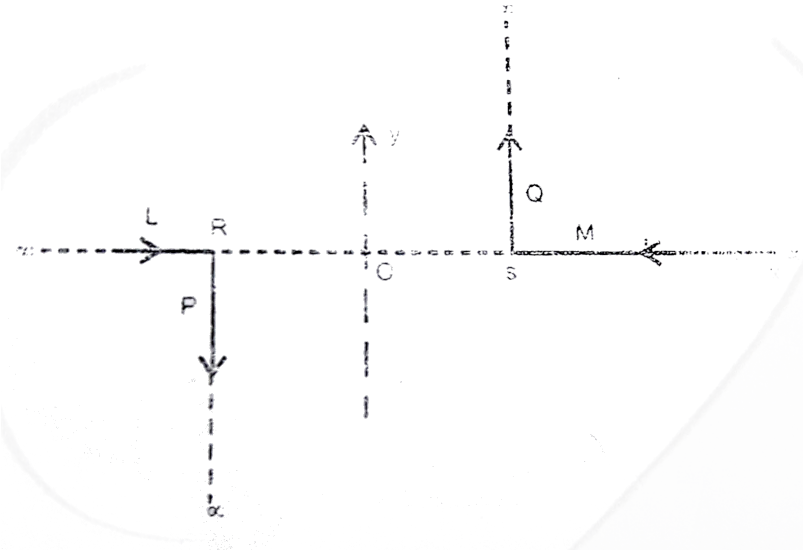
25. A pair of stationary and infinitely long bent wires is placed in the $X-Y$ plane as shown in figure.The wires carry currents of $10A$ each as shown.The segments L and M are along the x-axis.The segments P and Q are pallel to the Y-axis such that $OS=OR=0.02m$.Find the magnitude and

direction of the magnetic induction at the origin O.



A. $10^{-2}Wb/m^2$ vertically downward

B. $100Wb/m^2$ vertically upward

C. $10^{-4}Wb/m^2$ vertically downward

D. $10^{-4}Wb/m^2$ vertically upward

Answer: D

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26. The current in the windings on a toroid is $2.0A$. There are 400 turns and the mean circumferential length is $40cm$. If the inside magnetic field is $1.0T$, the relative permeability is near to

A. 200

B. 300

C. 400

D. 100

Answer: C

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27. A moving coil galvanometer needs a current of 100muA for a full scale deflecion of 50 divisions. If the resistance of the galvanometer is 1000 Omega, then its current senstivity is

A. $5 \times 10^6 \text{div} / A$

B. $5 \times 10^5 \text{div} / A$

C. $10 \times 10^5 \text{div} / A$

D. $15 \times 10^6 \text{div} / A$

Answer: B

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28. A rectangular coil of effective area $0.05m^2$ is suspended freely in aradiul magnetic field of 0.001 Wb / m^2. The torsional

constant of the suspension fibre is $5 \times 10^{-9} Nm$/degree. If a current of 300muA is passed through it, then the angle through which the coil rotates is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: A

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29. A rectangular coil of area $\vec{A}$ and number of turns n is placed in a uniform magnetic field vecB. If the coil carries a current I, then the torque acting on the coil is given by

A. $ni\left(\vec{A}.\vec{B}\right)$

B. $\frac{1}{n}\left(i\vec{A}\times\vec{B}\right)$

C. $\frac{1}{n}\left(i\vec{A}.\vec{B}\right)$

D. $ni\left(\vec{A}\times\vec{B}\right)$

Answer: D

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30. Two galvanometer A and B require the current of 4 mA and 7mA repectively to produce the same deflection of 20 divisions. Then

A. A is less sensitive than B

B. `A is more sensitive than B

C. Both A and B are equally sensitive

D. sensitive of B is 7/4 times that of A

Answer: B

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31. A current carrying circular loop is freely suspended by a long thread. The plane of the loop will point in the direction

A. point along North south

B. point along East west

C. will rmain a 45° with the east west direction

D. remain in any position

Answer: B

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32. The scale of a galvanometer is divided into 150 equal divisions. The galvanomter has a current sensitivity of 15 div per ma and voltage senstivity of 3 div per milliovolt. What is the resisance of the galvanometer?

A. 10Ω

B. 15Ω

C. 5Ω

D. 2.5Ω

Answer: C

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33. A rectangular coil of 50 turns, each of area $0.1m^2$and carrying a current of 1 A is held perpendicular to a magnetic field of 0.1 T. What is the torque acting on the coil?

A. $0.5Nm$

B. $1Nm$

C. $zero$

D. $0.001Nm$

Answer: C

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34. The magnetic field at the center of a moving coil galvanometer is 0.25 T. The coil has an area of 0.2 m^(2) and

has 28 turns. If the current senstivity of the MCG is to be increased by 25%, then the number of turns in the coil should be incrased by_____.Assume that all other things are kept constant.

A. 7

B. 8

C. 10

D. 12

Answer: A

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35. Two flat circular coils A and B are made from two identical copper wires, each of length 50 cm. If the number of turns inA

and B are 6 and 3 respectively, and the same current flows though them, then the ratio of the magnetic fields at the currents of A and B will be

A. 2

B. 3

C. 4

D. 5

Answer: C

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36. A torque of 2.5 Nm acts on a current carrying rectangular coil of area $0.2m^2$, suspended vertically in a uniform magnetic field. What is the torque, if the rectangular coil is replaced by

a plane circular coil of the same area? [all other quantities are unaltered]

A. $2.5Nm$

B. $1.5Nm$

C. $3Nm$

D. $5Nm$

Answer: A

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37. A wire of length l carries a steady current. It is bent first to form a circular plane loop of one turn. The magnetic field at the centre of the loop is B. The same length is now bent more

sharply to give a double loop of smaller radius. The magnetic field at the centre caused by the same is

A. unaltered

B. half of its value

C. double of its first value

D. four times of its first value

Answer: D

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38. A coil of radius 2 cm and 500 turns, carries of a current of 2A. It is placed in a uniform magnetic field of induction 0.5T. What is the torque acting on the coil if $\theta = 30^\circ$?

A. $0.314N - m$

B. $0.628Nm$

C. $0.157N - m$

D. $6.28Nm$

Answer: A

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39. A coil of a moving coil galvanometer has 100 turns and effective area of$0.005m^2$. It is suspended in a radial magnetic field of induction$0.001Wb/m^2$. The torque per unit twist of thr suspension fibre is $5 \times 10^{-9}Nm$/degree. What is the currebnt sectivity of the moving coil galvanometer?

A. 10^5 degree/ampere

B. 10^7 degrees/ampere

C. 2×10^6 degrees/ampere

D. 3×10^5 degrees/ampere

Answer: B

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40. A current carrying coil will orient itself so that its plane becomes

A. inclined at 45◦ to the magnetic field

B. inclined at any arbitray angle to the magnetic field

C. parallel to the magnetic field

D. perpendicular to the magnetic field

Answer: C

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41. A conducting circular loop of radius r carries a constant current i. It is placed in a uniform magnetic field $\vec{B}$ such that vecB is perpendicular to the plane of the loop. What is the torque acting on the loop?

A. $zero$

B. $ir\vec{B}$

C. $3\pi ri\vec{B}$

D. none of these

Answer: B

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42. The coild of a galvanometer consists of 100 turn and effective area $1cm^2$. The restoring couple is $10^{-8}n - m/rad.$ The magnetic field between the pole pieces 5 tesla. The current sensitivty per micro ampere.

A. 2×10^{-7}peramp

B. $5ra\frac{d}{\mu}$ amp

C. $5 \times 10^2 rad$/mu amp

D. 5×10^{-6} per amp

Answer: B

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43. Two galvanometers A and B require 3 mA and 5 mA respectively to produce the same deflection of i_0 division. Then

A. A and B are equally sensitive

B. Sensitiveness of B is 5/3 times that of A

C. B is more sensitive than A

D. A is more sensitive B

Answer: D

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44. A circular coil of 20 turns each of radius 10 cm and carrying a current of 5 A is placed in a uniform magnetic field of induction 0.10 T normal to the plane of the coil?

A. $0.314Nm$

B. $zero$

C. $31.4Nm$

D. $3.14Nm$

Answer: B

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45. When the current in a moving coil galvanometer is increased by$2\mu A$, the deflection is increased by $5\circ$. What is the senstivity of the M.C.G?

A. $\frac{2^\circ}{\mu}A$

B. $\frac{2.5^\circ}{\mu}A$

C. $\frac{3^\circ}{\mu}A$

D. $\frac{5^\circ}{\mu}A$

Answer: B

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46. A moving coil galvanometer has a current sensitivity of xx div/ma and voltage senstivity of Y div/V. What is the resistance pf thr galvanometer?

A. $\frac{X}{Y}10^3 ohm$

B. $\frac{X}{Y}ohm$

C. $\frac{Y}{X}ohm$

D. $\frac{Y}{X}10^3 ohm$

Answer: A

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47. The senstivity of a milliammeter of range 0 to 100 mA is x div/milliampere. If it is conveeted into an ammeter of ranger 0 to1a, by using a suitable shunt, then the senstivity will be

A. $\frac{x}{2}$ div/Ma

B. 10x div/Ma

C. $\frac{x}{10}$ div/mA

D. 5x div/mA

Answer: C

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48. A conducting circular loop of radius r carries a constant i. It is placed in a uniform magnetic field B such that B is perpendiclar to the plane of thre loop is .What is the magnetic force acting on the loop?

A. irB

B. $2\pi irB$

C. $zero$

D. πirB

Answer: C

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49. Sensitivity of a moving coil galvanometer can be increased by

A. decreasing the number of turns of the coil

B. increasing the number of turns of the coil

C. decreasing the area of the coil

D. by using a weak magnet

Answer: B

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50. The magnetic field inside a solenoid is

A. directly prportional to its length

B. inversely prportional to the total numbers of turn

C. inversely proportional to the current

D. directly proportional to the current

Answer: D

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51. What is the magnetic field at the cemter of a coil in the form of a square of side $4\sqrt{2}cm$ and carrying a current of $4A$?

A. $8 \times 10^{-7}T$

B. $6 \times 10^{-7}T$

C. $4 \times 10^{-7}T$

D. $3 \times 10^{-7}T$

Answer: A

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52. Three moving coil galvanometer A,B and C are made of coils of three different material having torsional constant 1.8×10^{-8}, 2.8×10^{-8} and 3.8×10^{-8} respectively if the three galvanometer are identical in all other respect then in which of the above cases sensitivity maximum

A. all have equal senstivity

B. A

C. B

D. C

Answer: C

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53. A moving coil galvanometer has 150 equal divisions. Its current sensitivity is 10-divisions per milliampere and voltage sensitivity is 2 divisions per millivolt. In order that each division reads 1 volt, the resistance in ohms needed to be connected in series with the coil will be -

A. 9995Ω

B. $10^3\Omega$

C. $10^5\Omega$

D. 99995Ω

Answer: A

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54. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of permanent magnet. Such that $\overrightarrow{B}$ is in plane of the coil. If due to a current I in the triangle, a torque τ acts on it, the side l of the triangel is:

A. $\frac{\sqrt{3}BI}{4L^2}$

B. $\frac{\sqrt{3}BIL^2}{4}$

C. $\frac{4L^2}{\sqrt{3}BI}$

D. $\frac{\sqrt{3}L^2}{4BI}$

Answer: B

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55. A square current carrying loop is suspended in a unifrom magnetic field acting in the palne of the loop. If the force on one arm of the loop is $\vec{F}$, the net force on the remaining three arms of the loop is

A. $\vec{F}$

B. $-3\vec{F}$

C. $-\vec{F}$

D. $3\vec{F}$

Answer: C

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56. A moving coil galvanometer has a voltage senstivity of I division per millivolt and current sentivity of 10 divisions per milliampere scale. What resistance should be connected in series with the galvanometer coil, so that it reads I volt per division?

A. $10,000\Omega$

B. $9,900\Omega$

C. $9,990\Omega$

D. $9,950\Omega$

Answer: C

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57. To increase the current sensitivity of a moving coil galvanometer by $50\,\%$ its resistance is increased so that the new resistance becomes twice its initial resistance. By what factor does its voltage sensitivity change?

A. Increased by 50%

B. increased by 25%

C. decreased by 25%

D. decreased by 50%

Answer: C

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58. If only 1% of the total current is to be passed through a galvanometer of resistance G, then resistance of the shunt will be

A. $\frac{G}{25}\Omega$

B. $\frac{G}{25}\Omega$

C. $\frac{G}{49}\Omega$

D. $\frac{G}{99}\Omega$

Answer: D

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59. A galvanometer having a resistance of 18Ω is shunted by a wire of resistance 2Ω. If the total current to be passed is 2A,

then the part of it passing through the shunt will be

A. $0.8A$

B. $1.5A$

C. $1.8A$

D. $1.25A$

Answer: C

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60. An ammeter has a resistance R and a range I. To increase its range to nL, the resistance that should be connected in parallel with it, is given by

A. $R(n+1)$

B. $R(n-1)$

C. $\frac{R}{n-1}$

D. $\frac{R}{n}$

Answer: C

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61. When a current of 1 Ampere is passed through a galvanometer coil, it is deflected through 20°. But when it is shunted by a resistance of 12 Omega the same current produces a deflection of 5°. The resistance of the galvanometer is

A. 12Ω

B. 20Ω

C. 36Ω

D. 40Ω

Answer: C

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62. A galvanometer of resistance 100 Omega, gives a full scale deflection for a current of 10 mA. To convert it into a voltmeter to read 0 to 100 V, the value of the high resistance that should be connected in series with the galvanometer will be

A. 4900Ω

B. 9900Ω

C. 6000Ω

D. 1000Ω

Answer: B

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63. A galvanometer of resistance 20Ωhas current senstivity of 5 div/mA. The instrument has 50 divisions. How will you convert it into voltmeter reading upto 25 volt?

A. join a resistance of 1240 Omega in series

B. join a resistance of 2480 Omega in series

C. join a resistance of 2480 Omega in parallel

D. join a shunt of 20 Omega

Answer: B

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64. The combinant resistance of a galvanometer of resistance $500\Omega$and its shunt is 25Ω. What is the value of the shunt?

A. $\frac{100}{19}\Omega$

B. $\frac{19}{500}\Omega$

C. $\frac{300}{19}\Omega$

D. $\frac{500}{19}\Omega$

Answer: D

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65. An ammeter of resistance50Ω reads 0.5 A, when connected in a circuit. What is the new ammeter reading, if it is shunted by a resistance of10Ω? Assume that the current in the main circuit is unchanged.

A. $\frac{1}{10}A$

B. $\frac{1}{5}A$

C. $\frac{1}{12}A$

D. $\frac{1}{20}A$

Answer: C

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66. An ammeter consists of a galvanometer of a resistance 45Ωshunted with a resistance of3Ω. If the current rating of that can be measured by the ammeter will be

A. $2A$

B. $4A$

C. $6A$

D. $8A$

Answer: D

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67. When a moving coil galvanometer is shunted with a resistance of 10Ω,the deflection in the galvanometer reduces

from 30 divisions to 6 divisions. The resistance of the galvanometer is

A. 40Ω

B. 50Ω

C. 30Ω

D. 20Ω

Answer: A

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68. A galvanometer has a current range $of 15mA$ and a voltage range $of 0.75V$. To convert this galvanometer into an ammeter of range $15A$, the shunt resistance is

A. $\frac{100}{999}\Omega$

B. $\frac{50}{999}\Omega$

C. $\frac{200}{999}\Omega$

D. $\frac{150}{999}\Omega$

Answer: B

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69. The deflection in a moving coil galvanometer is reduced to half, when it is shunted with a resistance 40Ω. The resistance of the galvanometer is

A. 20Ω

B. 40Ω

C. 60Ω

D. 80Ω

Answer: B

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70. A current of ImA is flowing through a resistance of 1000Ω. To measure the potential difference across it, a voltmeter should be used whose resistance is

A. 1000Ω

B. 100Ω

C. very large as compared to $10^3\Omega$

D. $zero\Omega$

Answer: C

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71. There are 3 voltmeters A,B,C having the same range but their resistance are $15,000\Omega$, $10,000\Omega$and $5,000\Omega$ respectively. The best voltmeter amongst them is the one whose resistance is

A. 5000Ω

B. $10,000\Omega$

C. $15,000\Omega$

D. all are equally good

Answer: C

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72. A milliammeter of range 0 to 25 mA and a range of 0 to 25 V. The resistance that should be connected in series will be

A. 930Ω

B. 960Ω

C. 990Ω

D. 1010Ω

Answer: C

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73. In an ammeter, 4% of the total current is passing through the galvanomter. If the shunt resistance is 5Ω, then the

resistance is Omega`, then the resistance of the galvanometer will be

A. 30Ω

B. 60Ω

C. 120Ω

D. 240Ω

Answer: C

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74. The range of an ammeter of resistance G can be increased from I to nI by connecting,

A. a parallel resistance of G/n

B. a series resistance of Gn

C. a parallel resistance of G/(n-1)

D. a series resistance of G(n-1)

Answer: C

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75. A galvanometer having a resistance of 100Ω has 25 divisions. A current of$0.4mA$ deflect the pointer of the galvanometer into a voltmeter of 0 to 25 V, it should be connected with a resistance of

A. 2000Ω as shunt

B. 2400Ω as shunt

C. 2400Ω in series

D. 2500Ω in series

Answer: C

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76. The deflection in a MCG is reduced from 40 divisions to 10 divisions, when a shunt of$10\Omega$is joined across it. What is the resistance of the galvanometer coil ?

A. 20Ω

B. 30Ω

C. 40Ω

D. 50Ω

Answer: B

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77. Which one of the following is likely to have the largest resistance?

A. a moving coil galvanometer

B. an ammeter of range 0 to 100 A

C. a copper wire of length 1 m and diameter 2 mm

D. a voltmetr of range 0 to 10 V

Answer: D

Watch Video Solution

78. A galvanometer of resistance 500Ωgives a full scale deflection, for a current of $20mA$. Even without using a high resistance in series, it can be used as a voltmeter. The range of the voltmetr will be

A. $0-5V$

B. $0-10V$

C. $0-15V$

D. $0-20V$

Answer: B

Watch Video Solution

79. If 10% of the main current is to be passsed through a maving coil galvanometer of resistance 99Ω, then the ratio of

its resistance and the shunt resistance will be

A. $1:9$

B. $9:1$

C. $1:11$

D. $11:1$

Answer: B

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80. The deflection in a galvanometer decreases to 1/5th of the original deflectioon, if it is shunted by a resistance of 5Ω. The resistance of the galvanometer is

A. 1Ω

B. 10Ω

C. 15Ω

D. 20Ω

Answer: D

Watch Video Solution

81. The enstivity of a galvanometer is $60\text{div}/Ampere$. When a shunt is used, its senstivity becomes $10\text{div}/Ampere$. If the resistance of the galvanometer is20Ω,then the value of the shunt used is

A. 5Ω

B. 4Ω

C. 15Ω

D. 20Ω

Answer: B

Watch Video Solution

82. If a galvanometer is shunted by $\left(\frac{1}{n}\right)th$ of the value of its resistance, then the fraction of the total current passing through the galvanometer is

A. n

B. $\frac{1}{n}$

C. $n-1$

D. $\frac{1}{1+n}$

Answer: D

Watch Video Solution

83. Of the two identical galvanometers one is to be converted into an ammeter and another into a milliammeter. Which of the shunts will be of larger resistance?

A. less

B. equal

C. more

D. zero

Answer: C

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84. A galvanometer of 25Ω resistance can read a maximum current of 6 mA . It can be used as a voltmeter to measure a maximum of 6 V by connecting a resistance to the galvanometer. Identify the correct choice in the given answers

A. $X = 575\Omega$ in series

B. $X = 800\Omega$ in parallel

C. $X = 975\Omega$ in parallel

D. $X = 975\Omega$ in series

Answer: D

Watch Video Solution

85. A certain current on passing through a galvanometer produces a deflection of 100 divisions. When a shunt of one ohm is connected, across it, the same current prodcues a deflection of 1 division. What is the falvanometern resistance?`

A. 10Ω

B. 9.9Ω

C. 100Ω

D. 99Ω

Answer: D

Watch Video Solution

86. An ammeter is obtained by shunting a 30Ω galvanometer with a 30Ω resistance. What additional shunt should be connected across it to double the range ?

A. 25Ω

B. 20Ω

C. 15Ω

D. 10Ω

Answer: C

Watch Video Solution

87. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a

A. high resistance in parallel

B. low resistance in series

C. low resistance in parallel

D. high resistance in series

Answer: D

Watch Video Solution

88. In a ammeter $0.2\,\%$ of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be

A. $\frac{1}{500}G$

B. $\frac{500}{499}G$

C. $\frac{1}{499}G$

D. $\frac{499}{500}G$

Answer: A

Watch Video Solution

89. A galvanometer has a resistance of G ohm and range of V volt. Calculate the resistance to be used in seres with it to extend its range its renge to nV volt.

A. $(n-1)G$

B. $\frac{G}{n-1}$

C. nG

D. $\frac{G}{n}$

Answer: A

Watch Video Solution

90. We have a galvanometer of resistance 25Ω. It is shunted by a 2.5Ω wire. The part of total current that flows through the galvanometer is given as

A. $\frac{1_g}{I} = \frac{1}{11}$

B. $\frac{I_g}{I} = \frac{2}{11}$

C. $\frac{I_g}{I} = \frac{3}{11}$

D. $\frac{I_g}{I} = \frac{4}{11}$

Answer: A

Watch Video Solution

91. A galvanometer has a resistance of 3663Ω. A shunt S is connected across it such that $(1/34)$ of the total current passes through the galvanometer. Then the value of the shunt is

A. 111Ω

B. 3553.3Ω

C. 3663Ω

D. 107.7Ω

Answer: A

Watch Video Solution

92. To decrease the range of an ammeter its resistance need to be increased an ammeter has resistance R_0 and range I which of the following resistance can be connected in series with it to decrease its range to I/n

A. $\frac{R_0}{n+1}$

B. $\frac{R_0}{n-1}$

C. $\frac{R_0}{n}$

D. None of these

Answer: D

Watch Video Solution

93. A galvanometer has a sensitivity of 60 division/ampere. When a shunt is used its sentivity becomes 10 divisions/ampere. What is the value of shunt used if the resistance of the galvanometer is 20Ω?

A. 4Ω

B. 5Ω

C. 20Ω

D. 8Ω

Answer: A

Watch Video Solution

94. A voltmeter of range $0 - 10V$ and resistance 200Ωcannot be used as an ammeter, whose range is

A. $0 - 500mA$

B. $0 - 250mA$

C. $0 - 100mA$

D. $0 - 25mA$

Answer: D

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95. A galvanometer of resistance 50Ω is connected to a battery of $3V$ along with resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the

galvanometer. In order to reduce this deflection to 20 division the above series resistance should be

A. 1000Ω

B. 1200Ω

C. 1500Ω

D. 1800Ω

Answer: C

Watch Video Solution

96. By mistake, a voltmeter is connected in series and an ammeter is connected in parallel, with a resistance in an electrical circuit. What will happen to the instruments?

A. Voltmeter is damaged

B. Ammeter is damaged

C. Both are damaged

D. None of these

Answer: D

Watch Video Solution

97. An ammeter has an internal resistance of50Ω when it is connected in a circuit containing a battery and twio resistance of 300Ω and 200Ωin series, it reads 1.2 . The actual current in the circuit, will be

A. $1.2A$

B. less than 1.2 A

C. more than 1.2 A

D. $10A$

Answer: C

Watch Video Solution

98. A galvanometer whose resistance is 120Ω gives full scale deflection with a curretn of $0.5A$ so that it can read a maximum current of $10A$. A shunt resistance is added in parallel with it. The resistance of the ammeter so formed is

A. 0.3Ω

B. 0.6Ω

C. 0.8Ω

D. 1.2Ω

Answer: B

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99. When a resistance of 100Ω is connected in series with a galvanometer of resistance R, then its range is V. To double its range, a resistance of 1000Ω is connected in series. Find the value of R.

A. 900Ω

B. 100Ω

C. 500Ω

D. 800Ω

Answer: D

Watch Video Solution

100. A moving coil galvanometer is converted into an ammeter reads upto $0.03A$ by connecting a shunt of resistance $4r$ across it and ammeter reads up $0.06A$, when a shunt of resistance r is used. What is the maximum current which can be sent through this galvanometer if no shunt is used ?

A. $0.03A$

B. $0.04A$

C. $0.02A$

D. $0.001A$

Answer: C

Watch Video Solution

101. An electrical meter of internal resistance 20Ω gives a through it. What is the maximum current, that can be measured by connecting three resistors each or resistance 12Ω in parallel with the meter?

A. $6mA$

B. $8mA$

C. $10mA$

D. $4mA$

Answer: A

Watch Video Solution

102. When a galvanometer is shunted by resistance S, then its current capacity increases n times. If the same galvanometer is shunted by another resistance S', then its current capcity will increase by n' is given by

A. $\frac{n+S}{S}$

B. $\frac{S(n-1)-S'}{S}$,

C. $\frac{(n+1)S}{S}$,

D. $\frac{S(n-1)+S'}{S}$

Answer: D

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Watch Video Solution

103. A voltmeter of range 2 V and resistance 300Ω cannot be converted into ammeter of range

A. $100mA$

B. $1mA$

C. $10mA$

D. $1A$

Answer: B

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104. A certain galvanometer, when shunted with a resistance of 5Ωgives a full scale deflection for 250 mA. Similarly, if a

resistance of 290Ω is connected in series with the same galvanometer, it gives a full deflection for 25 volts. What is the resistance of the galvanometer?

A. 5Ω

B. 10Ω

C. 15Ω

D. 20Ω

Answer: B

Watch Video Solution

105. An ammeter and a voltmeter are j oined in series to a cell. Their readings are A and V respectively. If a resistance is now joined in parallel with the voltmeter

A. both A and V will decreases

B. A will increases and V will decreases

C. A and V will increases

D. A will increases and V will increases

Answer: B

Watch Video Solution

106. A moving coil galvanometer of resistance 100Ω is used as an ammeter using a resistance 0.1Ω. The maximum diflection current in the galvanometer is $100\mu A$. Find the minimum current in the circuit so that the ammeter shows maximum deflection

A. $100.1mA$

B. $1.0001mA$

C. $10.01mA$

D. $1.01mA$

Answer: A

Watch Video Solution

107. In the following circuit, the ammeter reads 5 A and the voltmeter reads 50 V. The actual resistance R is

A. 10Ω

B. less than 10Ω

C. more than 10Ω

D. $zero$

Answer: C

View Text Solution

108. In the following circiut, the ammeter reads 10 A and the voltmeter reads 50 V. The actual value of R is

A. $zero$

B. 5Ω

C. less than 5Ω

D. more than 5Ω

Answer: C

View Text Solution

109. A galvanometer of resistance 50Ω, gives a full scale deflection for current of 50 mA. It is to be converted intyo an ammeter to read a maximum current 5 A. What should be the length of the resistance wire of specific resisrance$5 \times 10^{-7}\Omega$ and cross sectional area$2.97 \times 10^{-2} cm^2$, reqiured for this conversion?

A. $7.5m$

B. $6m$

C. $3m$

D. $1.5m$

Answer: C

Watch Video Solution

110. In the following circuit, the ammmeter A reads 1.5 A and the laboratory voltmeter reads 15V. The value of R

A. is less than 10Ω

B. is more than 10Ω

C. is exactly equal to 10Ω

D. may be more or less than 10Ω

Answer: B

View Text Solution

111. A $100V$ voltmeter of internal resistance $20k\Omega$ in series with a high resistance R is connected to a $110V$ line. The voltmeter reads $5V$, the value of R is

A. $210K\omega$

B. $270K\omega$

C. $350K\Omega$

D. $420K\omega$

Answer: D

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112. A voltmeter has a range $O - V$ with a series resistance R . With a series resistance $2R$, the range is $O - V$. The correct

relation between V and V' is

A. $V' = 2V$

B. $V' > 2V$

C. $V' < 2V$

D. $V' = \frac{V}{2}$

Answer: C

Watch Video Solution

113. A galvanometer of resistance 16Ωshows a full scale deflection for a curent of 20 mA. The only shunt resistance that is available is 0.06Ω but it is not sufficient into an ammeter having a range of 8A. How much resistance should

be connected in series with the galavanometer to get the ammeter of the desired range?

A. 7.94Ω

B. 8.94Ω

C. 8.94Ω

D. 6.94Ω

Answer: A

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114. A range of galvanometer is V, when 50Ω resistance is connected in series. Its range gets doubled when 500Ω resistance is connected in series. Galvanometer resistance is

A. 100Ω

B. 200Ω

C. 300Ω

D. 400Ω

Answer: D

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115. The cyclotron frequency of an electron gyrating in a magnetic field of $1T$ is approximately:

A. $28MHz$

B. $280MHz$

C. $2.8 \times 10^{10} Hz$

D. $2.8 \times 10^9 Hz$

Answer: C

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116. A proton of energy E is moving in a circular path in a uniform magnetic field. The energy of an alpha particle moving in the same magnetic field and along the same path will be equal to

A. E

B. $2E$

C. $\frac{E}{2}$

D. $0.75E$

Answer: A

Watch Video Solution

117. When an electron, accelerated under a P.D of 1000 volts, enters a uniform transverse magnetic field, it experiences a force of $\sqrt{2}N$. What will be force acting on the same electron in the same magnetic field, if the accelerating potential is inclined to 2000 V?

A. $1N$

B. $1.5N$

C. $2N$

D. $3N$

Answer: C

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118. A proton describes a circular path of radius 5 cm in a transerve magnetic field. If the speed of the proton is doubled, then the radius of the circular path will be

A. $5cm$

B. $7.5cm$

C. $10cm$

D. $2.5cm$

Answer: C

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119. A proton of eneergy 1 MeV described a circuler path in a plane at right angles to be a uniform magnetic field of induction $2\pi \times 10^{-4}T$. The mass of the proton is $1.7 \times 10^{-27}kg$. The cyclotron frequency of the proton is very nearly equal to

A. $10^4 Hz$

B. $10^5 Hz$

C. $10^6 Hz$

D. $10^7 Hz$

Answer: A

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120. Protons are accelerated in a cyclotron where the appilied magnetic field is 2T and the P.D across the dees is 100 KV. How many revolutions the protons has to complete to acquire a K.E. MeV?

A. 50

B. 100

C. 150

D. 200

Answer: B

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121. A particle having a charge 100 times that of an electron is revolution in a circular path of radius 0.4 m, with 1 rev/s. What is the magnitude of the magnetic field produced at its center?

A. $10^{-7}\mu_0$

B. $10^{-17}\mu_0$

C. $2 \times 10^{-17}\mu_0$

D. $2 \times 10^{-15}\mu_0$

Answer: C

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122. A proton moving with a velocity of $2.5 \times 10^7 \frac{m}{s}$, enter a magnetic feildof 2T, making an angle of 30◦ with the magnetic

field. The force acting on the proton

A. $2 \times 10^{-12} N$

B. $3 \times 10^{-12} N$

C. $4 \times 10^{-12} N$

D. $6 \times 10^{-12} N$

Answer: C

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123. A cyclotron of radius 64 cm accelerates deuterons. If the cyctron frequency is$5 \times 10^{6} Hz$, then the maximum speed with which the deuterons emerge will be

A. $2 \times 10^{6} \frac{m}{s}$

B. $3 \times 10^7 \frac{m}{s}$

C. $2 \times 10^7 \frac{m}{s}$

D. $3 \times 10^6 \frac{m}{s}$

Answer: C

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124. In a cyclotron a deutron gains maximum energy of 30 Mev. What is the maximum energy gained by a proton for the same cyclotron setting?

A. $30MeV$

B. $40MeV$

C. $50MeV$

D. $60MeV$

Answer: D

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125. Identify the correct statement from thee following.

A. Cyclotron frequency depends upon the speed of the charged particle

B. Cyclotron frequency does not depends upon the speed of charged particle

C. Kinetic energy of a charged particle in a cyclotron is independent of its charge

D. Kinetic energy of a charge particle in a cyclotron is independent of its mass

Answer: B

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126. In a cyclotron, the gyro-radius is directly proportional to the

A. energy of the particle

B. strength of the magnetic field

C. linear momentum of the particle

D. specific charge of the particle

Answer: C

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127. In a cyclotron, a position enters prependicular to the magnetic field of induction $3.57 \times 10^{-5} T$. What is the time taken by the position to complete a circular orbit? $\left[m_p = 9.1 \times 10^{-31} kg \text{ and } e = 1.6 \times 10^{-19} C\right]$

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128. In a cyclotron, the angular frequency of a charged particle is independent

A. its mass

B. its charge

C. its speed

D. the magnetic field

Answer: C

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129. A charged particle moves through a magnetic field perpendicular to its direction. Then

A. the momentum changes but the kinetic energy is constant

B. kinetic energy charges but the momentum is constant

C. both, momentum and kinetic energy of the particle are constant

D. both momentum and kinetic energy of the particle are not constant`

Answer: A

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130. A charged particle of mass m and charge q travels on a circular path of radius r that is perpendicular to a magnetic field B. The time takeen by the particle to complete one revolution is

A. $\frac{2\pi m}{qB}$

B. $\frac{2\pi mq}{B}$

C. $\frac{2\pi qB}{m}$

D. $\frac{\pi mq}{B}$

Answer: A

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131. In a cyclotron, a charged particle

A. undergoes acceleration all time

B. speeds up between the dees becausee of the magnetic field

C. speeds up in dee

D. slows down with a dee and speeed up between dees

Answer: A

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132. A n electrically charged particle enters into a uniform magnetic induction field in a direction perpendicular to the field with a velocity v then it travels

A. with a force in the direction of the field

B. in a circular path with a radius directly proportional to v^2

C. in a circular path with a radius directly proportional to its velocity

D. in a straight line without accleration

Answer: C

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133. In cyclotron for a given magnet radius of the semicircle traced by positive ion is directly proportional to (where v= velocity of positive ion)

A. v^{-2}

B. v^{-1}

C. v

D. v^2

Answer: C

Watch Video Solution

134. A charged particle is moving in a uniform magnetic field in a circular path. Radius of circular path is R. When energy of particle is doubled, then new radius will be

A. radius will become $\frac{r}{2}$

B. radius will be $r\sqrt{2}$

C. radius will be $\frac{r}{\sqrt{2}}$

D. radius will not change

Answer: C

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135. A deutron of kinetic energy 50 KeV is described a circular orbit 0.5 m in a plane perpendicular to a magnetic field B.

What is the kinetic energy of a proton described a circluar orbit of radius 0.6 m in the same plane with the same B?

A. $50KeV$

B. $100KeV$

C. $150KeV$

D. $200KeV$

Answer: B

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136. A cyclotron is used to accelerate protons, deutrons, alpha-particles,etc. The maxumum kinetic energy acquired by the accelerated protons is E. What will be the maximum K,E,

acquired by the alpha-partcles if they are accelarated under the same experimental conditions?

A. E

B. $\frac{E}{2}$

C. $4E$

D. $2E$

Answer: A

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137. A beam of protons moving with a velocity of $4 \times 10^5 \frac{m}{s}$ enetrs a uniform magnetic field of 0.3 T at an angle of 60° with the magnetic field. What is the radius of the helical path

described by the proton beam? $[m_p = 1.67 \times 10^{-27} kg$ and the charge on the proton $= 1.6 \times 10^{-19}$C]

A. $10^{-2}m$

B. $1.2 \times 10^{-2}m$

C. $1.5 \times 10^{-2}m$

D. $2.5 \times 10^{-2}m$

Answer: B

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138. In a cylotron, for the same values of B and R, what is the ratio of the maximum kinetic energies of alpha particles and deutrons?

A. $1:1$

B. $\frac{3}{2}:1$

C. $2:1$

D. $3:1$

Answer: C

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139. A bullet of mass $2gm$ is having a charge of $2\mu c$. Through what potential difference must it be accelerated, starting from rest, to acquire a speed of $10m/s$

A. $50V$

B. $500V$

C. $50kV$

D. $5kV$

Answer: C

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140. A beam of electrons passes underfected throgh unifromly perpendicular electric and magnetic fields. If the electric fiedl is swiched off, and the same magnetic field is mainted fiedl is maintetained the electrons move:

A. in a elliptical orbit

B. in a circular orbit

C. along a parabolic path

D. along a straight line

Answer: D

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141. A particle of mass m, charge q and kinetic energy T enters in a transverse uniform magnetic field of induction B. After the 3 s, the kinetic energy of the particle will be

A. $2T$

B. T

C. $3T$

D. $4T$

Answer: B

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142. Electron oving with different speeds enters a transverse uniform magnetic field. They will describe circular path

A. of the same radius

B. of larger radii for the faster electrons

C. of smaller radii for the faster electrons

D. either (b) or (c) depending on the magnitude of the magnetic field

Answer: B

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143. A current carrying circular loop of radius 10 cm, has a magnetic induction of$3.6 \times 10^{-5} T$at its center. What is the magnetic dilpoe moment of the loop?

A. $150 \times 10^{-3} Am^2$

B. $180 \times 10^{-3} Am^2$

C. $160 \times 10^{-3} Am^2$

D. $145 \times 10^{-3} Am^2$

Answer: B

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144. In a region, steady and uniform electric and magnetic fields are present . These two fields are parallel to each other.

A charged particle is released from rest in this region . The path of the particle will be a

A. helix

B. straight line

C. ellipse

D. circle

Answer: B

Watch Video Solution

145. A particle of mass M and charge Q moving with velocity $\vec{v}$ describe a circular path of radius R when subjected to a uniform transverse magnetic field of induction B. The work done by the field when the particle completes one full circle is

A. $BQ2\pi R$

B. $\left(\frac{Mv^2}{R}\right)2\pi R$

C. $BQv2\pi R$

D. $zero$

Answer: D

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146. If an electron and a proton having same momenta enter perpendicular to a magnetic field, then

A. they will move undeflected

B. curved path of the electron and the proton will be the same (ignoring the sense of revolution)

C. the path of proton is more curved then that of the electron

D. curved path of the electron is more curved than that of the proton

Answer: B

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147. A circular loop of radius R, carrying current I, lies in $x - y$ plane with its center at origin. The total magnetic flux through $x - y$ plane is

A. inversly proportional to R

B. directly proportional to R

C. zero

D. directly proportional to I

Answer: C

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148. An electron of mass m and charge q is accelerated from rest in a uniform electric field of strength E. The velocity acquired by it as it travels a distance l is

A. $\left[\frac{2Eql}{ql}\right]^{\frac{1}{2}}$

B. $\left[\frac{2Eq}{ml}\right]^{\frac{1}{2}}$

C. $\left[\frac{2Em}{ql}\right]^{\frac{1}{2}}$

D. $\left[\frac{Eq}{ml}\right]^{\frac{1}{2}}$

Answer: A

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149. An electron moving in a circular orbit of radius r makes n rotation per secound. The magnetic field produced at the centre has magnitude

A. $zero$

B. $\frac{\mu_0 n^2 e}{r}$

C. $\frac{\mu_0 ne}{2r}$

D. $\frac{\mu_0 ne}{2\pi r}$

Answer: C

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150. Two particles of masses m_a and m_b and same charge are projected in a perpendicular magnetic field . They travel along circular paths of radius r_a and r_b such that $r_a > r_b$. Then which is true ?

A. $m_a > m_b$ and $v_a > v_b$

B. $m_a v_a > m_b v_b$

C. $m_b v_b > m_a v_a$

D. $m_a = m = m_b$ and $v_a > v_b$

Answer: B

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151. An electron is accelerated from rest to potential V. the final velocity of electron is

A. $\frac{\sqrt{eV}}{m}$

B. $\frac{\sqrt{2ev}}{m}$

C. $\frac{\sqrt{4eV}}{m}$

D. $\frac{\sqrt{eV}}{2m}$

Answer: B

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152. When a charged particle moving with velocity $\vec{V}$ is subjected to a magnetic field of induction $\vec{B}$ the force on it is non-zero. This implies that:

A. $\angle$ between $\vec{v}$ and $\vec{B}$ can have any value other than 0° to 180°

B. angle between $\vec{v}$ and $\vec{B}$ is either 0° to 180°

C. angle between $\vec{v}$ and $\vec{B}$ is neitherly 90°

D. angle between $\vec{v}$ and $\vec{B}$ can have any value other than 90°

Answer: A

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153. An electron moves in a circular orbit with a uniform speed v.It produces a magnetic field B at the centre of the circle. The radius of the circle is proportional to

A. $\frac{B}{v}$

B. $\frac{v}{B}$

C. $\frac{\sqrt{B}}{v}$

D. $\frac{\sqrt{v}}{B}$

Answer: D

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154. A thin ring of radius R metre has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolution/s. The value of magnetic induction in Wbm^{-2} at the centre of the ring is

A. $\frac{\mu_0 q}{2fR}$

B. $\frac{\mu_0 qf}{2R}$

C. $\frac{\mu_0 q}{2\pi fR}$

D. $\frac{\mu_0 qf}{2\pi R}$

Answer: B

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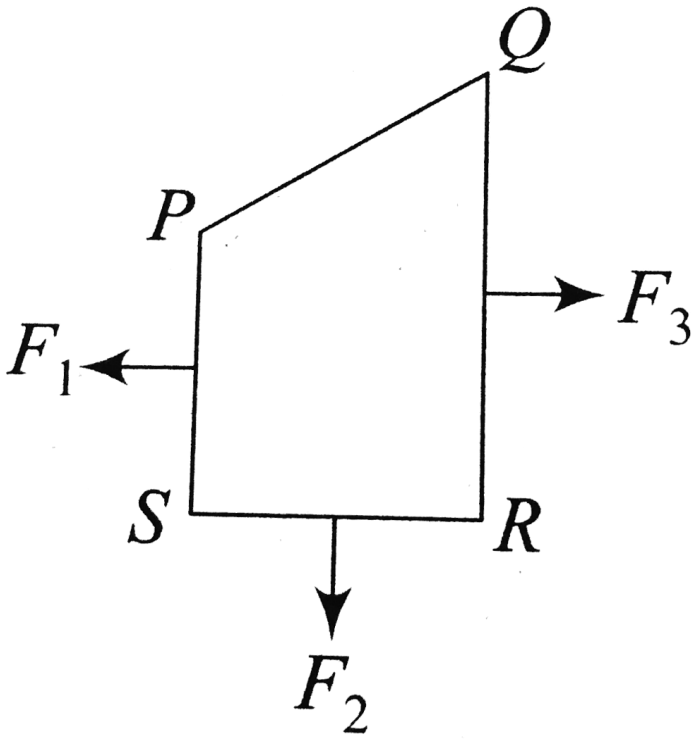
155. A closed loop $PQRS$ carrying a current is place in a unifrom magnetic forces on segments PS, SR and RQ are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment

QP is



A. $F_3 - F_1 - F_2$

B. $F_3 - F_1 + F_2$

C. $\sqrt{(F_3 - F_1)^2 + F_2^2}$

D. $\sqrt{(F_3 - F_1)^2 - F_2^2}$

Answer: C

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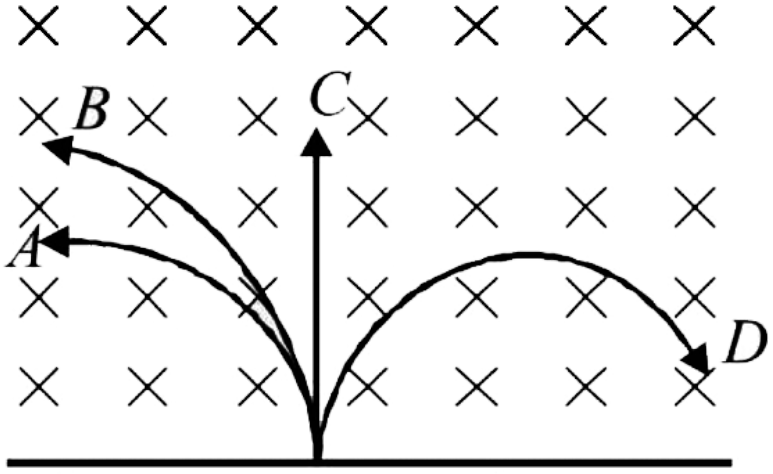
156. A neutron, a proton , and an electron and an alpha particle enter a region of constant magnetic field with equal velocities . The magnetic field is along the inward normal to the plane of the paper . The tracks of the particles are labelled in fig. the electron follows track .... and the alpha particle follows track.....



A. C,A

B. `A,C

C. C,A

D. B,D

Answer: D

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157. Due to the flow of current in a circular loop of radius R, the magnetic induction produced at the centre of the loop is B. The magnetic moment of the loop is (μ_0=permeability constant)

A. $\frac{2\pi BR^2}{\mu_0}$

B. $\frac{BR}{2\pi\mu_0}$

C. $\frac{2\pi BR^3}{\mu_0}$

D. $\frac{BR^2}{2\pi\mu_0}$

Answer: C

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158. A particle of mass m and charge q moves with a constant velocity v along the positive $x-$ direction. It enters a region containing a uniform magnetic field B directed along the negative z direction, extending from $x = a$ to $x = b$. The minimum value of v required so that the particle can just enter the region $x > b$ is

A. $\frac{q(b-a)B}{m}$

B. $\frac{qaB}{m}$

C. $\frac{q(b+a)B}{m}$

D. $\frac{qbB}{m}$

Answer: A

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159. A charged particle with charge q enters a region of constant, uniform and mututally orthogonal fields $\vec{E}$ and $\vec{B}$ with a velocity $\vec{v}$ perpendicular to both $\vec{E}$ and $\vec{B}$, and comes out without any change in magnitude or direction of $\vec{v}$. Then

A. $\vec{V} = \frac{\vec{B} \times \vec{E}}{B^2}$

B. $\vec{V} = \frac{\vec{E} \times \vec{B}}{E^2}$

C. $\vec{V} = \frac{\vec{B} \times \vec{E}}{E^2}$

D. $\vec{V} = \frac{\vec{E} \times \vec{B}}{B^2}$

Answer: D

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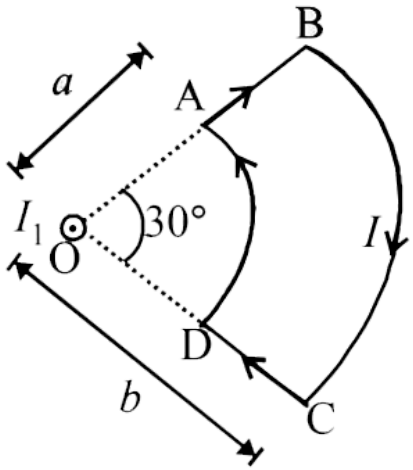
160. A current loop $ABCD$ is held fixed on the plane of the paper as shown in figure. The arcs $BC(radius = b)$ and $DA(radius = a)$ of the loop are joined by two straight wires AB and CD at the origin O is 30^(@). $A \neg herstraightth \in wirewithsteadycurrentI\_(1)`$ flowing out of the plane of the paper is kept at the origin .



The magnitude of the magnetic field (B) due to the loop $ABCD$ at the origin (o) is :

A. $\frac{\mu_0 I}{4\pi}\left[\frac{b-a}{ab}\right]$

B. $\frac{\mu_0 I}{4\pi}\left[\left(2(b-a)+\frac{\pi}{3}(a+b)\right]\right.$

C. $\frac{\mu_0 I(b-a)}{24ab}$

D. $zero$

Answer: C

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161. A circular coil of length L and radius r carries a current I. It provides a magnetic field of induction B at its center. Now the coil is bent sharply so as from a circular coil of n turns of rqual radii. The new induction at the center of this coil is

A. nB

B. n^2B

C. $\frac{B}{n}$

D. $\frac{B}{n^2}$

Answer: B

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162. There are two wires of the same metal of same area of cross section but having lengths in the ratio 2 : I. If same p.d. is applied across their ends, what will be the ratio of current in them?

A. 1

B. 2

C. 3

D. 4

Answer: A

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163. A current passing through a circular coil of two turns produces a magnetic field B as its centr. The coil is then rewound so as to have four turns and the same current is passed through it. The magnetic field at its centre now is

A. $\frac{B}{2}$

B. $2B$

C. $4B$

D. $\frac{B}{4}$

Answer: B

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164. A particle of charge q and mass m, is fired perpenducular to a magnetic field (B) with a velocity v. What is the frequency of revolution of the particle?

A. $\frac{2\pi}{Bq}$

B. $\frac{2\pi Bq}{m}$

C. $\frac{2\pi m}{Bq}$

D. $\frac{Bq}{2\pi m}$

Answer: D

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165. Two particles X and Y having equal charges, after being acceleration through the same potential difference, enter a

region of uniform magnetic field and describe circular paths of radii R_1 and R_2, respectively. The ratio of the mass of X to that of Y is

A. $\frac{\sqrt{R_1}}{R_2}$

B. $\frac{R_2}{R_1}$

C. $\frac{R_1}{R_2}$

D. $\left(\frac{R_1}{R_2}\right)$

Answer: D

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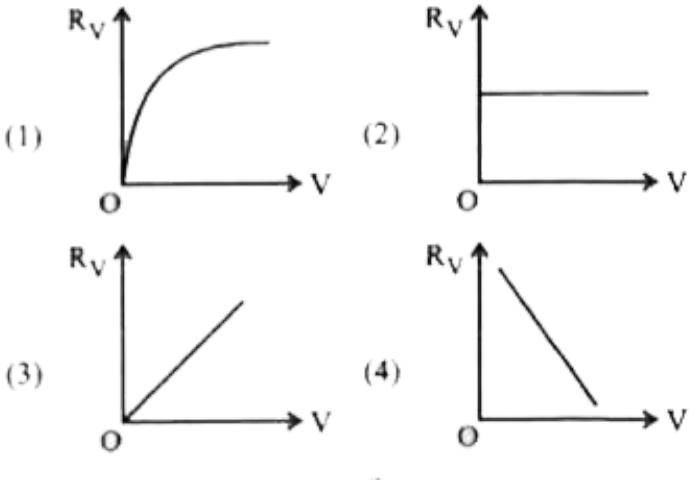
166. Which one of the fllowing graphs correctly represents the relation between the total effective resistance (R_v) of a multirange moving coil voltmeter (converted from a moving

coil galvanometer of resistance G) and its voltage range for full scale deflection?



A. $Figure 1$

B. $Figure 2$

C. $Figure 3$

D. $Figure 4$

Answer: C

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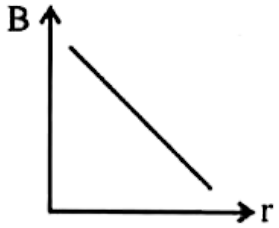
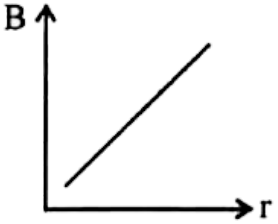
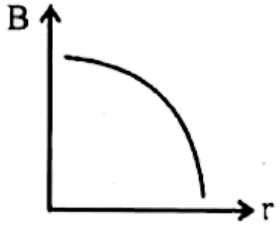
167. Which one of the following graphs gives the variation of magnetic induction B with distance r, from a very long wire carrying a current?

(1) 

(2) 

(3) 

(4) 

A. $figure(2)$

B. $figure(3)$

C. $figure(4)$

D. $figure(1)$

Answer: C

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168. A solenoid of 1.5 metre length and 4.0 cm diameter posses 10 turn per cm. A current of 5 ampere is flowing through it. The magnetic induction at axis inside the solenoid is

A. $\pi \times 10^{-5} T$

B. $2\pi \times 10^{-5} T$

C. $3\pi \times 10^{-5} T$

D. $4\pi \times 10^{-5} T$

Answer: B

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169. If 'R' is the radius of dees and 'B' be the magnetic field of induction which positive charges (q) of mass (m) escapes from the cyclotron, then its maximum speed $(V_{\max})$ is

A. $\frac{qR}{Bm}$

B. $\frac{qm}{BR}$

C. $\frac{qBR}{m}$

D. $\frac{m}{qBR}$

Answer: C

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170. The resistance of an ideal voltmeter is

A. a low resistance

B. a high resistnce

C. an infinite resistance

D. zero resistance

Answer: C

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171. A galvanometer of resistance 30Ω is connected to a battery of emf 2 V with 1970Ω resistance in series. A full scale deflection of 20 divisions is obtained in the galvanometer. To reduce the deflection to 10 divisions, the resistance in series required is

A. 4030Ω

B. 4000Ω

C. 3970Ω

D. 2000Ω

Answer: C

Watch Video Solution

172. Two particles X and Y having equal charges, after being acceleration through the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2, respectively. The ratio of the mass of X to that of Y is

A. $\frac{r_1}{r_2}$

B. $\frac{\sqrt{r}_1}{r_2}$

C. $\left[\frac{r_2}{r_1}\right]^2$

D. $\left[\frac{r_1}{r_2}\right]^2$

Answer: D

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173. The magnetic field (B) inside a long solenoid having n turns per unit length and carrying current / when iron core is kept in it is (μ_o = permeability of vacuum, χ = magnetic susceptibility)

A. $\mu_0 nI(I-\chi)$

B. $\mu_0 nL\chi$

C. $\mu_0 nI^2(I+\chi)$

D. $\mu_0 nI(I+\chi)$

Answer: D

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174. The senstivity of a moving coil galvanometer is 'S'. If a shunt of $\left(\frac{1}{8}\right)th$ of the resistance of the galvanometer is connected to the moving coil galvanometer, its senstivity becomes

A. $\frac{S}{3}$

B. $\frac{S}{6}$

C. $\frac{S}{9}$

D. $\frac{S}{12}$

Answer: C

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175. The range flux near the axis and inside the air core solenoid of length 60 cm carrying current 'I' is $1.7 \times 10^{-6} Wb$. Its magnetic moment will be (cross sectional area of a solenoid is very small as comapred to its length, $\mu_0 = 4\pi \times 10^{-7} SIunit$)

A. $0.25 Am^2$

B. $0.50 Am^2$

C. $0.75 Am^2$

D. $1 Am^2$

Answer: C

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176. A solenoid has 20 turns per cm. What is the value of the current that should be passed through the solenoid, to produce a magnetic field of 4 mT at its center?

A. $\frac{4}{\pi}A$

B. $\frac{5}{\pi}A$

C. $\frac{6}{\pi}A$

D. $\frac{8}{\pi}A$

Answer: B

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177. A long horizontal overhead high tension wire, fixed in east west direction carries a current of 60 A. What is the magnetic field at a point 3 m just below the power line? $\left[\mu_0 = 4\pi \times 10^{-7}\right]$

A. $2 \times 10^{-5} T$

B. $3 \times 10^{-6} T$

C. $4 \times 10^{-6} T$

D. $5 \times 10^{-5} T$

Answer: C

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178. A current of 10 A flows, through a toroid having a core of means radius 25 cm. If 5000 turns of the conducting wire are wound on the core, then the magnetic field the core of thre toroid is

A. $2 \times 10^{-2} Wb/m^2$

B. $3 \times 1 -^{-2} Wb/m^2$

C. $4 \times 10^{-2} Wb/m^2$

D. $6 \times 10^{-2} Wb/m^2$

Answer: C

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179. The current induction at the center of a colenoid of length 2 cm and diamteter 4cm is $3 \times 10^{-3} Wb/m^2$. What is the magnetic flux through the cross section of the solenoid ?

A. $2 \times 10^{-6} Wb$

B. $3.8 \times 10^{-6} Wb$

C. $5 \times 10^{-6} Wb$

D. $8 \times 10^{-6} Wb$

Answer: B

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180. Two wires with currents 3A and 1A are enclosed in a circular loop as shown in the figure . Another wire carrying a

current of 2A is situated outside the loop. What is the value of ointvecB.dvecl around the loop?

A. μ_0

B. $2\mu_0$

C. $3\mu_0$

D. $4\mu_0$

Answer: B

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181. A current I ampere flows along an infinitely long straight thin walled tube, then the magnetic induction at any point inside the tube is .

A. $zero$

B. $\frac{\mu_0}{4\pi} . \frac{2i}{r}$ tesla

C. $\frac{2i}{r}$ tesla

D. infinite

Answer: A

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182. The magnetic field inside a current carrying toroidal solenoid is 0.1 mT. What is the magnetic field inside the toroid If the current through it is doubled and its radius is made half?

A. $0.2mT$

B. $0.1mT$

C. $0.3mT$

D. $0.05mT$

Answer: A

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183. The current senstivity $(S_i)$of a moving coil galvanometer of resistance 200 Omega is I division per mA. Its voltage senstivity is

A. 5×10^{-2}div/mV

B. $5 \times 1 - ^{-4}$ div/mV

C. 5×10^{-3}div/mV

D. 5×10^{-1}div/mV

Answer: C

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184. A rectangular coil of 20 turns, each of area $20cm^2$is suspended freely in a uniform magnetic field of induction $6 \times 10^{-2}Wb/m^2$,with its plane inclined at 60◦ with the field. What is the magnitude of the torque acting on the coil, if a current of 100mA is passed through it?

A. $4 \times 10^{-5}N - m$

B. $8 \times 10^{-5}N - m$

C. $1.2 \times 10^{4}N - m$

D. $2.4 \times 10^{-4}N - m$

Answer: C

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185. The coil of a moving coil galvanometer has 100 turns each of area $15cm^2$. It is suspended in a radial magnetic field of induction $3 \times 10^{-2} Wb/m^2$. What is the current senstivity of the moving coil galvanometer, if the torsional constant of the suspension fiber is $1.5 \times 10^{-8} Nm$/radian`?

A. 1.5×10^5 rad/A

B. 3×10^5 rad/A

C. 4.5×10^5 rad/A

D. 6×10^5 rad/A

Answer: B

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186. A galvanometer has a current sectivuty of $2\frac{\div}{m} icroampere$. If the resistance of the galvanometer is 100Ω, its voltage senstivity will be

A. 2×10^3div/volt

B. 200div/volt

C. 2×10^4div/volt

D. 2×10^5div/volt

Answer: C

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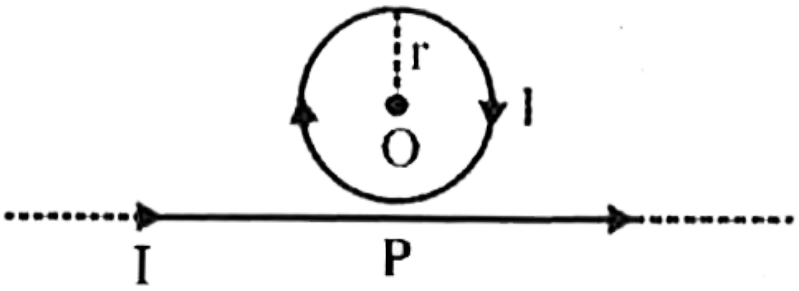
187. In the following figure the circular coil carrying cureent I is not supposed to touch at point P on the straight conductor carrying same current I. The magnitude of magnetic induction B at the same 'O' of the circular coil will be



A. $\frac{\mu_0 I}{2\pi r^2}$

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

C. $\frac{\mu_0 I}{2r}\left(1+\frac{1}{\pi}\right)$

D. $\frac{\mu_0 I}{2r}$

Answer: C

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188. A wire of length L is bent to form a circular loop of number of turns n. The coil is placed in a magnetic field of induction B and a current is passed through the coil. What will be the maximum torque acting on the coil?

A. Ibl^2

B. $zero$

C. $\frac{Ibl^2}{4\pi n}$

D. $\frac{4\pi n^2}{Ibl^2}$

Answer: C

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189. An ammeter of resistance R gives a full scale deflection when a current of 30 A is passed through it. We eant to convert it into an ammeter to measure the current only upto 10A. The value of the shunt required for this is

A. R

B. $\frac{R}{2}$

C. $\frac{R}{3}$

D. $\frac{R}{3}$

Answer: B

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190. A galvanometer with a scale divided into 150 equal division has a senstivity of 10 divisions per milliampere and a voltage senstivity of 2 divisions per milivolt. What is the resistance of the galvanometer ?

A. 2.5Ω

B. 5Ω

C. 7.5Ω

D. 10Ω

Answer: B

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191. The resistance of an ammeter having a range of 0 to 5 A is 1.8Ω. It is shunted by a small resistance of 0.2Ω. If the original dial and the scale indicating the current is not changed, then the effective current when its pointer indictaes 1.5 A will be

A. $10A$

B. $15A$

C. $20A$

D. $5A$

Answer: B

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192. The time period of a charged particle undergoing a circular motion in a uniform magnetic field is independent of its

A. speed

B. mass

C. magnetci induction

D. charge

Answer: A

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193. An electron of mass $'m'$ is accelerated through a potential difference of V and then it enters a magnetic field

of induction B. Normal to the lines of force. Then the radius of the circular path is

A. $\frac{\sqrt{mv}}{cB}$

B. $\frac{1}{B}\frac{\sqrt{2mV}}{e}$

C. $\frac{1}{B}\frac{\sqrt{mV}}{e}$

D. $\frac{\sqrt{mV}}{2qB^2}$

Answer: B

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194. In a cyclotron, if a deuteron can gain an energy of 40 MeV, then a proton can gain an energy of

A. $40MeV$

B. $80MeV$

C. $20MeV$

D. $60MeV$

Answer: B

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195. Which of the follwing particles will have minimum frequency of revolution when projected with the same velocity perpendicular to a magnetic field?

A. Electron

B. He^+

C. Li^+

D. proton

Answer: C

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