

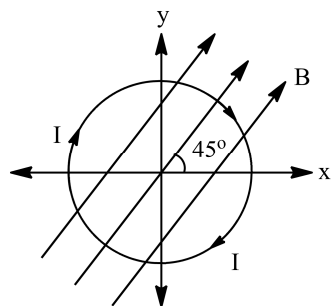


Max Marks: 60

Date: 15.10.2022

ARJUNA BATCH
PHYSICS : DCT SET - B
Topic: MEEC

1. A constant current I is flowing through a circular coil placed in uniform magnetic field \vec{B} as shown. Then:



- (a) The loop is in stable equilibrium
(b) The loop is in unstable equilibrium
(c) The torque acting on the loop is maximum
(d) The torque acting on the loop is the maximum torque
2. A bar magnet of moment $\vec{m} = (2\hat{i} + \hat{j} + 3\hat{k})\text{Am}^2$ is situated in a uniform magnetic field of induction $\vec{B} = (5\hat{j})$ milli tesla. The magnitude of the torque experienced by the magnet in Nm is:
(a) 5×10^{-3} (b) $5\sqrt{13} \times 10^{-3}$ (c) 2.5×10^{-2} (d) 1.0×10^{-2}
3. Two long conductors, separated by a distance d carry current I_1 and I_2 in the same direction. They exert a force F on each other. Now the current in one of them is increased to two times and its direction is reversed. The distance is also increased to $3d$. The value of the force between them is
(a) $-2F$ (b) $\frac{2F}{3}$ (c) $-\frac{2F}{3}$ (d) $-\frac{F}{3}$
4. A current of ' i ' amp flows in a loop having circular arc of radius ' r ' subtending an angle ' θ ' as shown in the figure. The magnetic field at the centre of the circle is

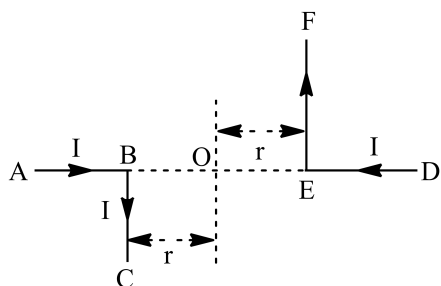


- (a) $\mu_0 i \theta / 4\pi r$ (b) $(\mu_0 i / 4r) \sin \theta$ (c) $(2\mu_0 i / 2r) \sin \theta$ (d) $(\mu_0 i / 4\pi r) \sin \theta$

Space for Rough Work

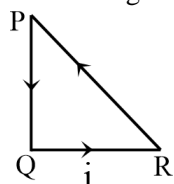


5. Two long thin wires ABC and DEF are arranged as shown. The magnitude of the magnetic field at O is



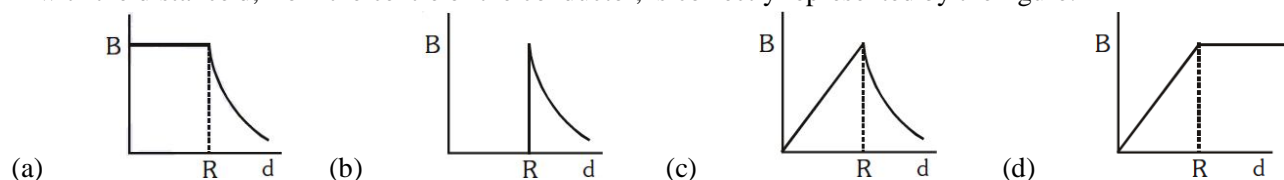
- (a) $\frac{\mu_0 I}{4\pi r}$ (b) $\frac{\mu_0 I}{2\pi r}$ (c) $\frac{\mu_0 I}{2\sqrt{2}\pi r}$ (d) zero

6. PQR is a right-angled isosceles triangular loop carrying an anticlockwise current. It is kept in a uniform magnetic field acting along QP. If the force acting on segment QR is \vec{F} , the force acting on segment PR is:

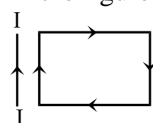


- (a) \vec{F} (b) $-\vec{F}$ (c) $\sqrt{2}\vec{F}$ (d) $-\sqrt{2}\vec{F}$

7. A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field B with the distance d, from the centre of the conductor, is correctly represented by the figure:



8. A rectangular loop carrying current I is located near an infinite long straight conductor carrying current I as shown in the figure. The loop

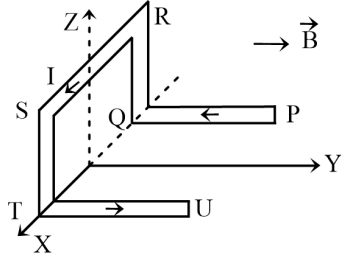


- (a) Remain stationary (b) Is attracted towards the wire
(c) Is repelled away from the wire (d) Will rotate about an axis parallel to the wire

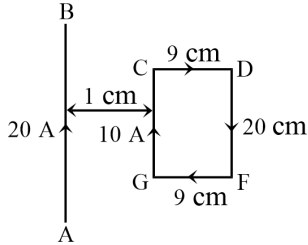
Space for Rough Work



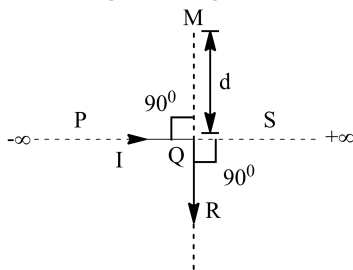
9. A conductor PQRSTU, each side of length L , is bent as shown in the figure. It carries a current i and is placed in a uniform magnetic induction B directed parallel to the positive Y -axis. The force experienced by the wire and its direction are:



- (a) $2iBL$ directed along the negative Z -axis
(b) $5iBL$ directed along the negative Z -axis
(c) iBL directed along the negative Z -axis
(d) $2iBL$ directed along the positive Z -axis
10. In the fig, the force exerted on the loop by the wire is



- (a) 3.6×10^{-4} N towards left
(b) 3.6×10^{-4} N towards right
(c) 7.2×10^{-4} N towards right
(d) 7.6×10^{-4} N towards left
11. An infinitely long conductor PQR is bent to form a right angle as shown in the figure. A current I flows through PQR. The magnetic field due to this current carrying conductor at the point M is B_1 . Now, another infinitely long straight conductor QS, is connected at Q so that the current is $\frac{1}{2}I$ in QR as well as in QS, the current in PQ remaining unchanged. The magnetic field at M is now B_2 . The ratio B_1/B_2 is given by

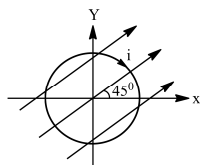


- (a) $1/2$ (b) 1 (c) $2/3$ (d) 2

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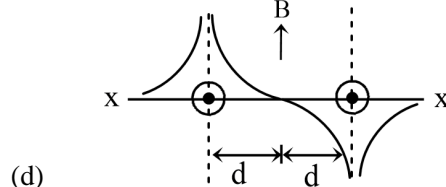
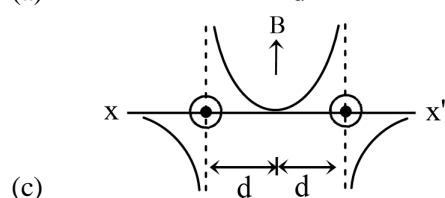
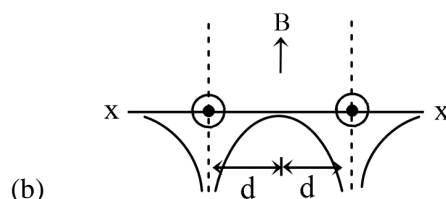
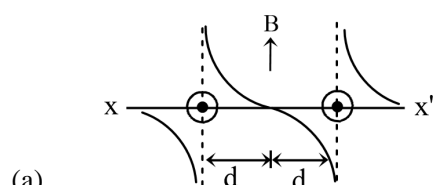


12. A circular loop of radius 20 cm is placed in a uniform magnetic field $\vec{B} = 2\text{T}$ in an X-Y plane. The loop carries a current 1 A in the direction shown in the figure. The magnitude of torque acting on the loop is nearly



- (a) 0.25 N-m (b) $\frac{0.25}{\sqrt{2}}$ N-m (c) 0.75 N-m (d) $\frac{0.75}{\sqrt{2}}$ N-m

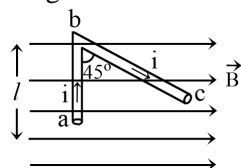
13. Two long parallel wires are at a distance apart



14. A wire of length l carries a current i along the X-axis. A magnetic field exists which is given as $\vec{B} = B_0(\hat{i} + \hat{j} + \hat{k})\text{T}$. Find the magnitude of the magnetic force acting on the wire.

- (a) B_0il (b) $\sqrt{2}B_0il$ (c) $2B_0il$ (d) $\frac{1}{\sqrt{2}}B_0il$

15. A wire abc is carrying a current i . It is bent as shown in the figure and is placed in a uniform magnetic field of magnetic induction B . Length $ab = 1$ and $\angle abc = 45^\circ$. The ratio of force on ab and on bc is:



- (a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$ (c) 1 (d) $\frac{2}{3}$

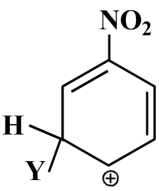
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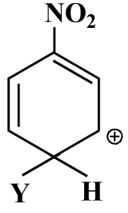
ARJUNA BATCH
CHEMISTRY : DCT SET – B
Topic: Full Organic

16. Assertion: Deoxyribose, $C_5H_{10}O_4$ is not a carbohydrate
Reason: Carbohydrates are hydrates of carbon so compounds which follow $C_x(H_2O)_y$ formula are carbohydrates.
(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.
17. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is
(a) Methanoic acid (b) Ethanal (c) Methanol (d) Methanal
18. Which of the following carbocations is expected to be most stable?
- 

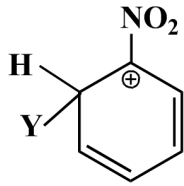
(a)



(b)



(c)



(d)
19. Which of the following is purine base
(a) Guanine (b) Cytosine (c) Thymine (d) Uracil
20. In Carius method 0.099 g organic compound gave 0.287 g AgCl. The percentage of chlorine in the compound will be
(a) 28.6 (b) 71.7 (c) 35.4 (d) 64.2
21. Amino acids are
(a) Liquids (b) Volatile solids
(c) Non-volatile crystalline compounds (d) Mixture of amines and acids

Space for Rough Work



22. Acetone when treated with chloroform form a condensation compound. It is
 (a) Ketol (b) Mesitylene (c) Phorone (d) Chloretone
23. Diazo-coupling is useful to prepare some
 (a) Pesticides (b) Proteins (c) Dyes (d) Vitamins
24. Which of the following is a carbohydrate
 (a) Leucine (b) Albumin (c) Inulin (d) Maltase
25. Number of structural isomers for C_6H_{14} is
 (a) 3 (b) 4 (c) 5 (d) 6
26. Which of the following is a natural polymer
 (a) Polyester (b) Glyptal (c) Starch (d) Nylon-6
27. Which of the following is not a sex hormone
 (a) Testosterone (b) Estrone (c) Estradiol (d) Cortisone
28. The number of sp^2 hybrid orbitals in a molecule of benzene is :
 (a) 24 (b) 6 (c) 12 (d) 18
29. Irreversible precipitation of proteins is also called
 (a) Denaturation (b) Hydrolysis (c) Rearrangement (d) Electrophoresis
30. $C_3H_8 + Cl_2 \xrightarrow{\text{Light}} C_3H_7Cl + HCl$ is an example of
 (a) elimination (b) substitution
 (c) addition (d) rearrangement reaction

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Space for Rough Work



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ARJUNA BATCH
PHYSICS : DCT SET - B ANSWER KEY
Topic: MEEC

1.	(c)	2.	(b)	3.	(c)	4.	(a)	5.	(b)
6.	(b)	7.	(c)	8.	(b)	9.	(c)	10.	(d)
11.	(c)	12.	(a)	13.	(a)	14.	(b)	15.	(c)

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ARJUNA BATCH
CHEMISTRY : DCT SET - B ANSWER KEY
Topic: Full Organic

16.	(d)	17.	(d)	18.	(a)	19.	(a)	20.	(b)
21.	(c)	22.	(d)	23.	(c)	24.	(c)	25.	(c)
26.	(c)	27.	(d)	28.	(d)	29.	(a)	30.	(b)