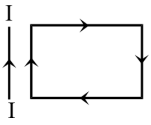
Max Marks: 60 **Date: 15.10.2022**

ARJUNA BATCH
PHYSICS : DCT SET - A
Topic: MEEC

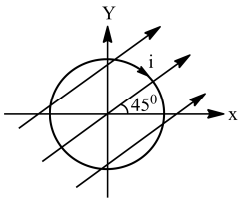
1. A rectangular loop carrying current I is located near an infinite long straight conductor carrying current I as shown in the figure. The loop



(a) Remain stationary (b) Is attracted towards the wire

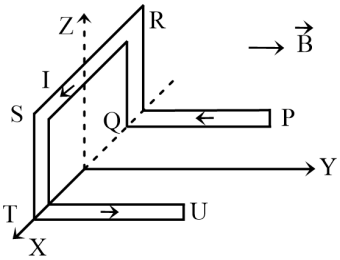
(c) Is repelled away from the wire (d) Will rotate about an axis parallel to the wire

2. A circular loop of radius 20 cm is placed in a uniform magnetic field $\vec{B} = 2T$ 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

3. 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

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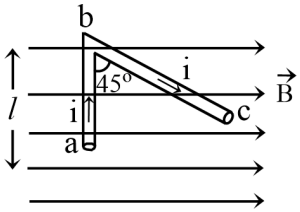
Space for Rough Work

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

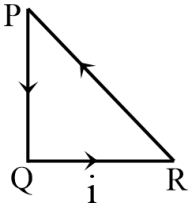
(a) B_0il (b) $\sqrt{2}B_0il$ (c) $2B_0il$ (d) $\frac{1}{\sqrt{2}}B_0il$

5. 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°. The ratio of force on ab and on bc is:



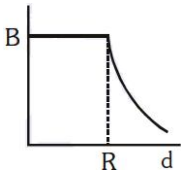
(a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$ (c) 1 (d) $\frac{2}{3}$

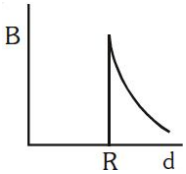
6. PQR is a right-angled isosceles triangular loop carrying an anticlockwise current. It is kept in a uniform magnetic field acting along QP. If the force acting on segment QR is $\vec{F}$, the force acting on segment PR is:

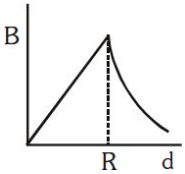


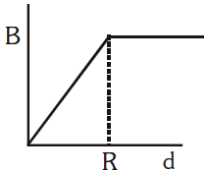
(a) $\vec{F}$ (b) $-\vec{F}$ (c) $\sqrt{2}\vec{F}$ (d) $-\sqrt{2}\vec{F}$

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:

(a) 

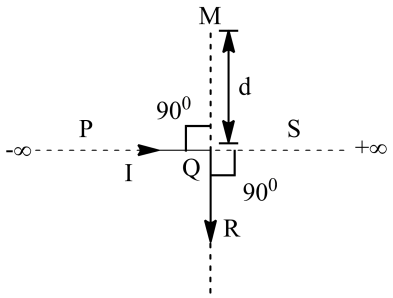
(b) 

(c) 

(d) 

Space for Rough Work

8. 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 is 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

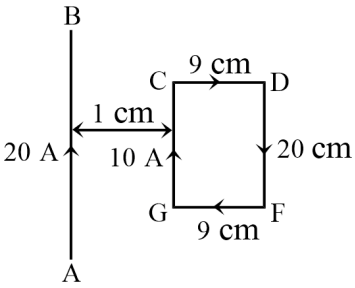


(a) 1/2 (b) 1 (c) 2/3 (d) 2

9. 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) $-\frac{F}{3}$

10. In the fig, the force exerted on the loop by the wire is

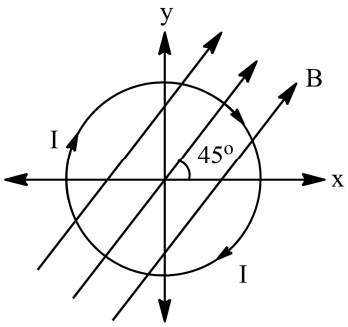


(a) 3.6×10^{-4} N towards left (b) 3.6×10^{-4} N towards right

(c) 7.2×10^{-4} N towards right (d) 7.6×10^{-4} N towards left

Space for Rough Work

11. 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

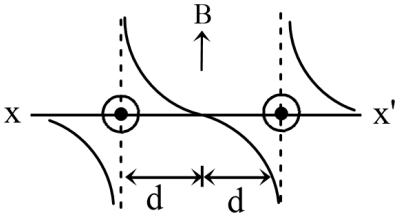
(c) The torque acting on the loop is maximum

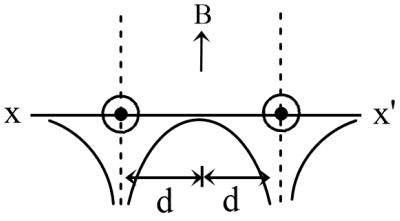
(d) The torque acting on the loop is the maximum torque

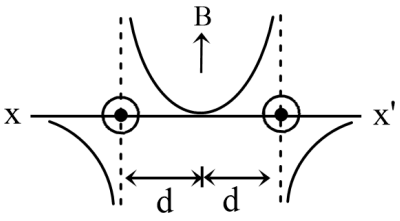
12. A bar magnet of moment $\overline{m} = (2\hat{i} + \hat{j} + 3\hat{k})Am^2$ is situated in a uniform magnetic field of induction $\overline{B} = (5\hat{j})$ milli tesla. The magnitude of the torque experienced by the magnet in Nm is:

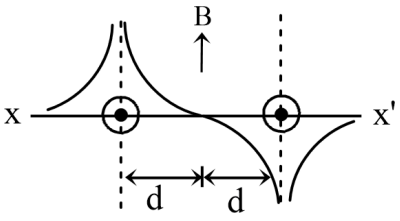
(a) 5×10^{-3} (b) $5\sqrt{13} \times 10^{-3}$ (c) 2.5×10^{-2} (d) 1.0×10^{-2}

13. Two long parallel wires are at a distance apart

(a)


(b)


(c)


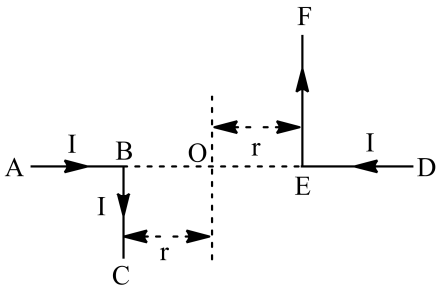
(d)


Space for Rough Work

14. 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) $(\mu_0 i/4\pi r)\sin\theta$

15. 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

Space for Rough Work

Max Marks: 60 **Date: 15.10.2022**

ARJUNA BATCH
CHEMISTRY : DCT SET - A
Topic: Full Organic

16. Amino acids are

(a) Liquids (b) Volatile solids

(c) Non-volatile crystalline compounds (d) Mixture of amines and acids

17. Acetone when treated with chloroform form a condensation compound. It is

(a) Ketol (b) Mesitylene (c) Phorone (d) Chloretone

18. Diazo-coupling is useful to prepare some

(a) Pesticides (b) Proteins (c) Dyes (d) Vitamins

19. Which of the following is a carbohydrate

(a) Leucine (b) Albumin (c) Inulin (d) Maltase

20. Number of structural isomers for C_6H_{14} is

(a) 3 (b) 4 (c) 5 (d) 6

21. Which of the following is a natural polymer

(a) Polyester (b) Glyptal (c) Starch (d) Nylon-6

22. Which of the following is not a sex hormone

(a) Testosterone (b) Estrone (c) Estradiol (d) Cortisone

23. The number of sp^2 hybrid orbitals in a molecule of benzene is :

(a) 24 (b) 6 (c) 12 (d) 18

24. Irreversible precipitation of proteins is also called

(a) Denaturation (b) Hydrolysis (c) Rearrangement (d) Electrophoresis

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Space for Rough Work

25. $C_3H_8 + Cl_2 \xrightarrow{\text{Light}} C_3H_7Cl + HCl$ is an example of

(a) elimination (b) substitution

(c) addition (d) rearrangement reaction

26. 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.

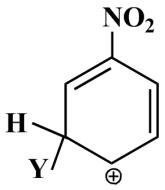
(c) Assertion is true but Reason is false.

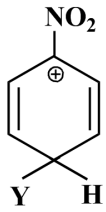
(d) Both Assertion and Reason are false.

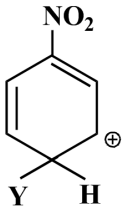
27. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is

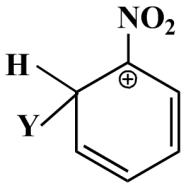
(a) Methanoic acid (b) Ethanal (c) Methanol (d) Methanal

28. Which of the following carbocations is expected to be most stable?

(a) 

(b) 

(c) 

(d) 

29. Which of the following is purine base

(a) Guanine (b) Cytosine (c) Thymine (d) Uracil

30. 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

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Space for Rough Work

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Knowledge is Discipline

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Max Marks: 60 **Date: 15.10.2022**

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

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

Max Marks: 60 **Date: 15.10.2022**

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

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