Code: Phy/ EM-4/MEC/003

Electromagnetism: Magnetic Effect of Electric Current (Set-3)

Answers Only

A-01	(a) No (b) Yes.
A-02	Yes, No.
A-03	Yes
A-04	Yes, No
A-05	Yes, if radius of circle is less than or equal to half of the sid of the cube
A-06	(a) Magnetic field along $\hat{k}$, (b) Magnetic field is parallel to Z-axis
A-07	Yes, Area vector of the loop is parallel or anti-parallel to the magnetic field.
A-08	If wire is not parallel to magnetic field then as per Lorentz's Force Law, magnetic field exerts force on wire i.e. $\alpha \neq 0$, due to realignment of magnetic field produced by current carrying wire.
A-09	$\alpha = 0$
A-10	-
A-11	(d)
A-12	(d)
A-13	(d)
A-14	(a)
A-15	(d)
A-16	(a)
A-17	(c)
A-18	(c)
A-19	(d)
A-20	(d)
A-21	(a), (d)
A-22	(a), (d)
A-23	(c), (d)
A-24	(a), (b), (d)
A-25	(b)
A-26	(a), (b)

A-27	(a), (b)
A-28	(b), (d)
A-29	(a), (b)
A-30	(b), (c)
A-31	9.6×10^{-12} N towards west
A-32	(a) Left, (b) 0.015 cm
A-33	$(-75\hat{\imath} + 100\hat{\jmath})$ m/s
A-34	3.0
A-35	3.7×10^{-6}m
A-36	$\frac{ma_0}{e}$ towards west, $\frac{2ma_0}{ev_0}$ downward
A-37	0.08 N perpendicular to both the wire and the field
A-38	0.02 N on each wire, on ab and dc towards left and on dc and ab downward
A-39	0.16 N
A-40	$\sqrt{2}B_0Il$
A-41	0.50 N towards the inside of the circuit
A-42	$2\pi aiB$, perpendicular to the plane of the figure going into it
A-43	$\frac{2\pi a^2 iB}{\sqrt{a^2+d^2}}$ downward
A-44	$2iBa$
A-45	-
A-46	-
A-47	0.25 N
A-48	$I\lambda B$
A-49	$2IRB$, upward in the figure
A-50	5.0×10^{-5} T
A-51	(a) 1.2 N (b) 1.3 N
A-52	$\frac{ilbB}{\mu mg}$
A-53	0.1

A-54	$\frac{\mu mg}{il}$
A-55	(a) $i\Delta lB$ towards the center (b) iaB
A-56	$\frac{ia^2B}{\pi r^2 Y}$
A-57	$iB_0 l$
A-58	(a) evB (b) vB (c) lBv
A-59	(a) $\frac{i}{Ane}$ (b) $\frac{iB}{An}$ upward (c) $\frac{iB}{nAe}$ (d) $\frac{iBd}{Ane}$
A-60	20 cm, 6.3×10^{-4}s
A-61	2 cm
A-62	3.4×10^{-4} T, 9.4×10^{6}
A-63	$\frac{\sqrt{8mK}}{el}$ where m is mass of proton,
A-64	12 cm
A-65	(a) 3.2×10^{-15} N (b) 2.1×10^{-4}m (c) 1.3×10^{-7} s
A-66	1.72×10^{14} m/s^2
A-67	(a) 8.8×10^{10}m/s (b) 5.0×10^{7}m/s
A-68	(a) $\frac{mv}{qB}$ (b) $\pi - 2\theta$ (c) $\frac{m}{qB}(\pi - 2\theta)$ (d) $\frac{mv}{qB}, \pi + 2\theta, \frac{m}{qB}(\pi + 2\theta)$
A-69	(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{6}$ (c) π
A-70	^{12}C and ^{14}C
A-71	119 cm and 120 cm
A-72	0.75mm

A-73	8 cm
A-74	-
A-75	(a) $\frac{qBd}{2m}$ (b) $\frac{d}{2}$, $\frac{3d}{2}$ (c) $\frac{\pi m}{6qB}$ (d) the particles stick together and the combined mass moves with constant speed v_m along the straight line drawn upward in the plane of figure through the point of collision
A-76	100 m/s
A-77	1.25×10^{5} C/kg
A-78	1.0×10^{4} N/C, 0.05 T
A-79	36 cm, 53 cm
A-80	6.4×10^{2}m/s and 1.0×10^{3} m/s
A-81	$\sqrt{\frac{2qE_0 z}{m}}$
A-82	-
A-83	0.5 T
A-84	(a) 6.2×10^{-2} N/m (b) 60^0
A-85	(a) Zero (b) 0.02 Nm parallel to the shorter side
A-86	0,13 Nm
A-87	(a) $\frac{iL^2B}{4\pi}$ (b) $\frac{iL^2B}{16}$
A-88	$\frac{mg}{2nil}$
A-89	-
A-90	-
A-91	-

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