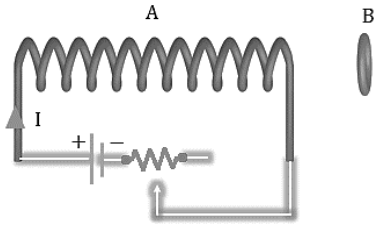
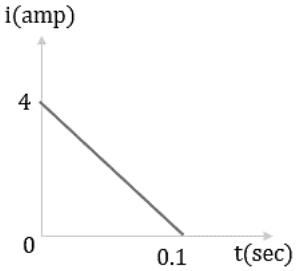
Q.1 An aluminum ring *B* faces an electromagnet *A*. The current through *A* can be altered. Then which of the following statements is correct:



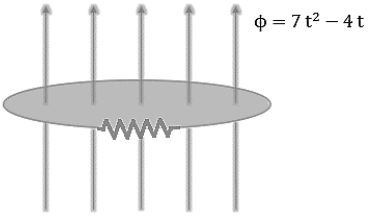
(A) If current decreases, *A* will repel *B*
(B) Whether current increases or decreases, *B* will not experience any force
(C) If current increases, *A* will repel *B*
(D) If current increases, *A* will attract *B*

Q.2 In a coil of resistance$\mathbf{10\ \Omega}$, the induced current developed by changing magnetic flux through it, as shown in figure, is a function of time. The magnitude of change in flux through the coil in **Weber** is



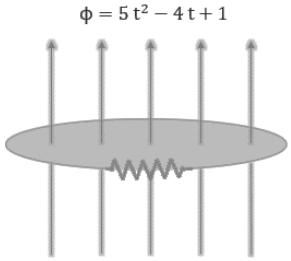
(A)8 **(B)**2 **(C)**6 **(D)**4

Q.3 The magnetic flux in a closed circuit, of resistance$\mathbf{20\ \Omega}$, varies with time ($\mathbf{t}$) according to the equation$\boldsymbol{\phi = 7t^2 - 4t}$. Where $\boldsymbol{\phi}$ is in **webers** and $\mathbf{t}$ is in**seconds**. The magnitude of the induced current at $\mathbf{t = 0.25\ sec}$is



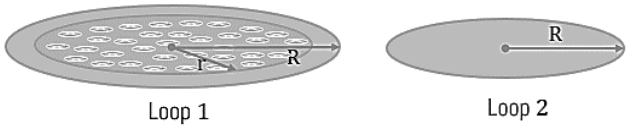
(A)0.25 A **(B)**0.025 A **(C)**50 Ma **(D)**175 mA

Q.4 Magnetic flux ϕ (in**Weber**) linked with a closed circuit of resistance $\mathbf{10\ \Omega}$ varies with time t (in**seconds**) as$\boldsymbol{\phi = 5t^2 - 4t + 1}$. The induced emf in the circuit at $\mathbf{t = 0.2\ sec}$is



(A)0.4 V **(B)**4 V **(C)**2 V **(D)**0.2 V

Q.5 A uniform magnetic field is restricted within a region of radius r. The magnetic field changes with time at a rate$\mathbf{dB/dt}$. The circular region containing magnetic field has a radius$\mathbf{r}$. Loop $\mathbf{1}$ of radius $\mathbf{R} >> r$ encloses the region $\mathbf{r}$ and Loop $\mathbf{2}$ of radius $\mathbf{R}$ is outside the region of magnetic field as shown in the figure. Then the **emf** generated is,



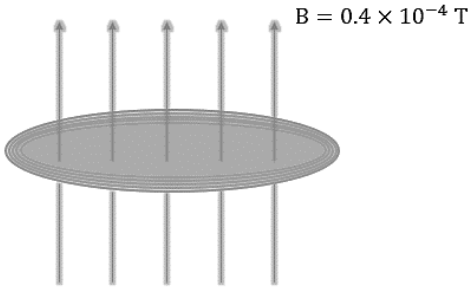
(A) Zero in loop 1 and zero in loop 2

(B) $-\frac{d\vec{B}}{dt}\pi r^2$ In loop 1 and $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 2

(C) $-\frac{d\vec{B}}{dt}\pi R^2$ In loop 1, zero in loop 2

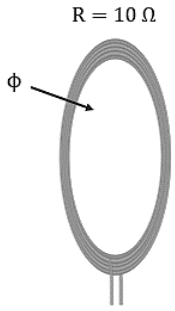
(D) $-\frac{d\vec{B}}{dt}\pi r^2$ in loop1, zero in loop 2

Q.6 A coil of mean area $\mathbf{500\ cm2}$ and having$\mathbf{1000\ turns}$, is held perpendicular to a uniform magnetic field of$\mathbf{0.4 \times 10^{-4}\ T}$. The coil is turned through $\mathbf{180}^\circ$ in $\mathbf{1/10seconds}$. Calculate the average induced**emf**?



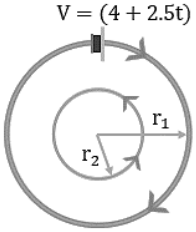
(A) 4 V **(B)** 0.4 V **(C)** 0.04 V **(D)** 0.8 V

Q.7 A magnetic flux of $\mathbf{5.5 \times 10^{-4}\ Wb}$ is linked with a coil of resistance $\mathbf{10\ \Omega}$ and$\mathbf{1\ turn}$. If the magnetic flux is changed to $\mathbf{5 \times 10^{-4}\ Wb}$ in$\mathbf{0.1\ sec}$, the induced charge in the coil is,



(A) 50 μC **(B)** 5 μC **(C)** 2 μC **(D)** 20 μC

Q.8 Two concentric, co-planar, circular loops have diameters $\mathbf{10\ cm}$ and $\mathbf{1\ m}$ and resistance per unit length of the wire, $\mathbf{10^{-4}\ \Omega/m}$. A time-dependent voltage $\mathbf{V = (4 + 2.5t)\ Volts}$ is applied to the larger ring as shown. The current induced in the smaller loop is approximately,

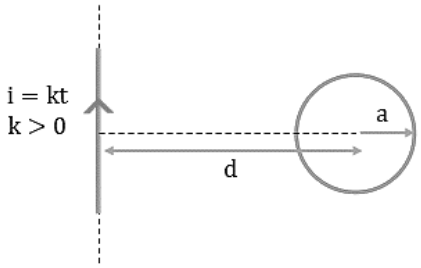


(A) 1 A **(B)** 2 A **(C)** 1.25 A **(D)** 2.5 A

Q.9 A square loop of side **22 cm** is changed into a circle in **0.4 sec**, inside a uniform magnetic field of **0.2 T**. The emf induced is,

(A) 6.6 mV **(B)** 3.3 mV **(C)** 1 mV **(D)** 13.2 mV

Q.10 Consider a long wire carrying a time varying current **i = kt** (**k > 0**). A circular loop of radius **a** and resistance **R** is placed with its center at a distance **d** from the wire(**a << d**). The induced current in the loop is



(A) $\frac{\mu_0 a^2 k}{4dR}$ **(B)** $\frac{\mu_0 d^2 k}{2aR}$ **(C)** $\frac{\mu_0 a^2 k}{2dR}$ **(D)** $\mu_0 \frac{(a+d)^2 k}{2aR}$

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(B)	(B)	(C)	(D)	(C)	(B)	(C)	(A)	(C)