Physicsaholics

DPP – 3 (Magnetism & Matter)

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/74

Video Solution on YouTube:- https://youtu.be/_48YAjetnWM

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/56

Q 1. The permanent magnet is made from which one of the following substances
(a) Diamagnetic (b) Paramagnetic
(c) Ferromagnetic (d) Electromagnetic

Q 2. The magnetic susceptibility is
(Symbols have their usual meaning)
(a) $\chi = \frac{I}{H}$ (b) $\chi = \frac{B}{H}$
(c) $\chi = \frac{M}{V}$ (d) $\chi = \frac{M}{H}$

Q 3. The magnetic susceptibility is negative for
(a) paramagnetic material only
(b) ferromagnetic material only
(c) paramagnetic and ferromagnetic materials
(d) diamagnetic material only

Q 4. Magnetic permeability is maximum for
(a) Diamagnetic substance (b) Paramagnetic substance
(c) Ferromagnetic substance (d) All of these

Q 5. The moment of a magnet (15cm×2cm×1cm) is 1.2 Am^2. What is its intensity of magnetization?
(a) $4 \times 10^4\ A/m$ (b) $2 \times 10^4\ A/m$
(c) $10^4\ A/m$ (d) None of these

Q 6. The magnetic susceptibility of a paramagnetic substance is 3×10^{-4} Is placed in a magnetising field of 4 x 10^{-4} A/m. Then the intensity of magnetisation in the units of A/m is
(a) 1.33×10^8 (b) 0.75×10^{-8}
(c) 12×10^{-8} (d) 14×10^{-8}

Q 7. Relative permeability of iron is 5500. What is its magnetic susceptibility?
(a) 5551 (b) 5491
(c) 5499 (d) 5501

Q 8. A rod of ferromagnetic material with dimension $10 \times 0.5 \times 0.2\ cm^3$ is placed in a magnetic field of strength $0.5 \times 10^4\ Am^{-1}$ as a result of which a magnetic moment of $5Am^2$ is produced in the rod. The value of magnetic induction will be
(a) 0.358 T (b) 0.54 T

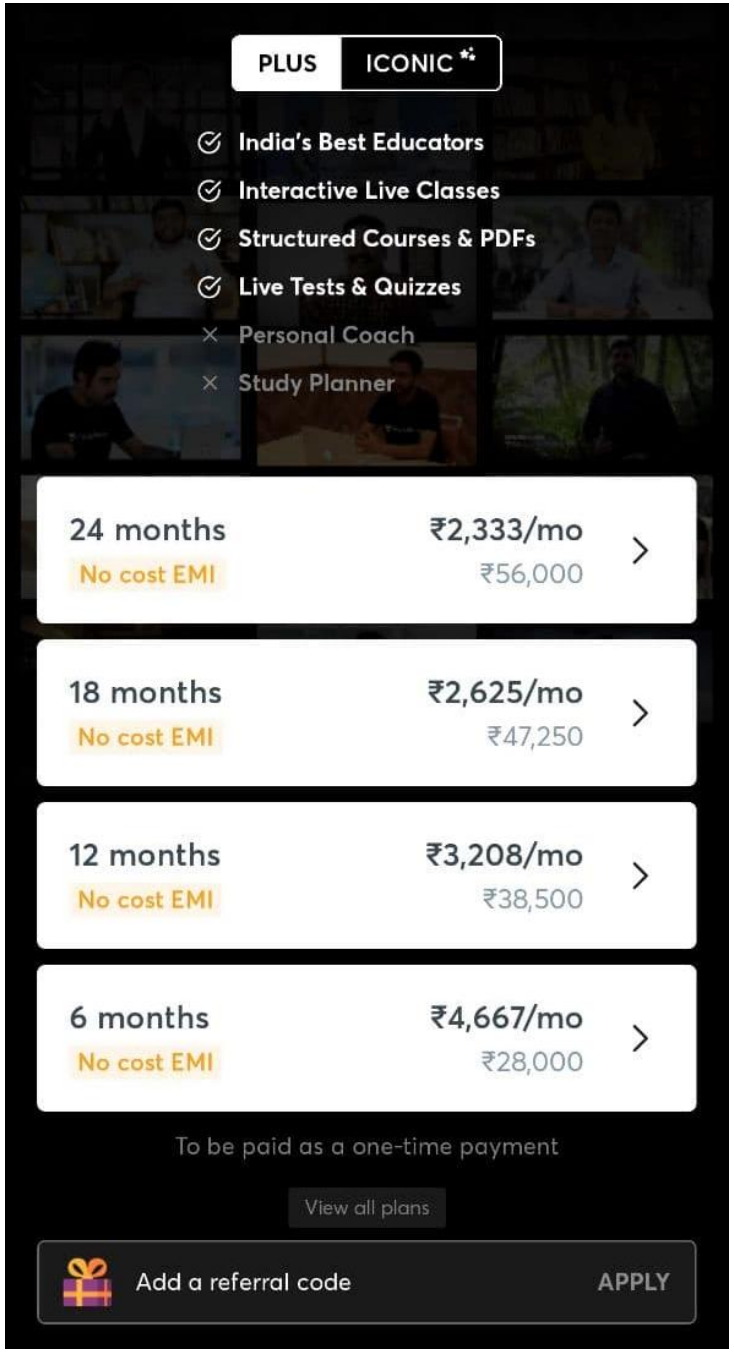
(c) 6.28 T (d) 2.5129 T

Q 9. The mass of iron rod is 110 gm, its magnetic moment is 20 Am^2. The density of iron is 8gm/cm^3. The intensity of magnetization is nearly
(a) $2 \times 10^5\ Am^{-1}$ (b) $2.26 \times 10^6\ Am^{-1}$
(c) $1.7 \times 10^6\ Am^{-1}$ (d) $1.4 \times 10^6\ Am^{-1}$

Q 10. The relative permeability of a substance X is slightly less than unity and that of substance Y is slightly more than unity then –
(a) X is paramagnetic and Y is ferromagnetic
(b) X is diamagnetic and Y is ferromagnetic
(c) X and Y both are paramagnetic
(d) X is diamagnetic and Y is paramagnetic

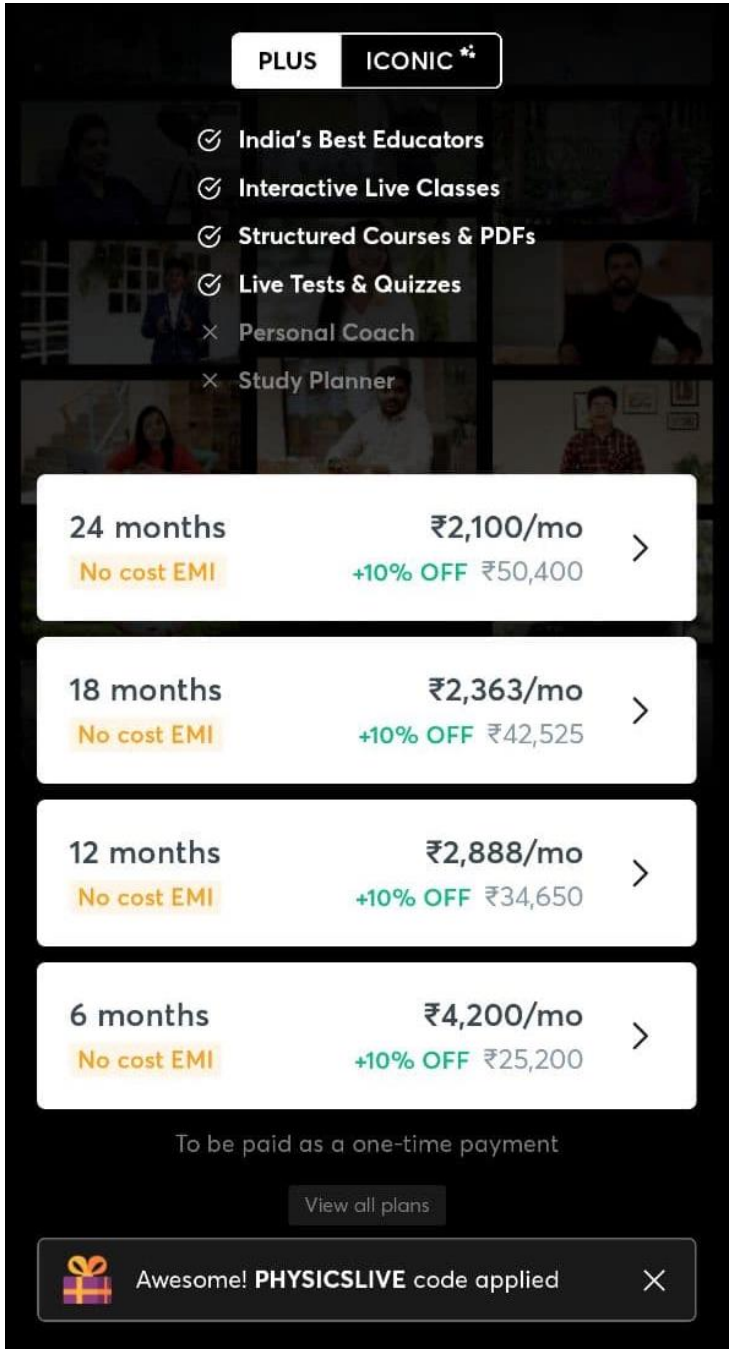
Answer Key

Q.1 c	**Q.2 a**	**Q.3 d**	**Q.4 c**	**Q.5 a**
Q.6 c	**Q.7 c**	**Q.8 c**	**Q.9 d**	**Q.10 d**



PHYSICSLIVE

Use code PHYSICSLIVE to get 10% OFF on Unacademy PLUS.



Written Solution

DPP-3 : Magnetic Properties of Matter- Intensity of magnetization, Type of magnetic material & Magnetic Susceptibility

By Physicsaholics Team

Solution: 1

Because in Ferromagnetic material, the permanent atomic magnetic moments have strong tendency to align themselves even without any external field

Ans. c

Solution: 2

$$\chi = \frac{I}{H}$$

where; χ = Susceptibility

I = Intensity of magnetisation

H = Magnetic Intensity.

Ans. a

Solution: 3

The magnetic susceptibility indicates whether a material is repelled out or attracted of a magnetic field. It is negative only for diamagnetic material. It is positive for paramagnetic material and ferromagnetic material has large positive magnetic susceptibility

Ans. d

Solution: 4

Magnetic permeability of a material is its ability to acquire the magnetism when it is exposed to a magnetic field. It is maximum for the ferromagnetic substance.

Ans. c

Solution: 5

$$I = \frac{M}{V}$$

$$I = \frac{1.2}{15 \times 2 \times 1 \times 10^{-6}} = \frac{1.2}{30} \times 10^{6}$$

$$I = \frac{120}{30} \times 10^{4}$$

$$\boxed{I = 4 \times 10^{4}\ A/m^{2}}$$ Ans.

Ans. a

Solution: 6

$\therefore \quad I = \chi H$

$= 3 \times 10^{-4} \times 4 \times 10^{-4}$

$I = 12 \times 10^{-8}$ A/m Ans.

Ans. c

Solution: 7

$$\mu_r = 1 + \chi$$

$$\Rightarrow \chi = \mu_r - 1$$

$$= 5520 - 1$$

$$\boxed{\chi = 5499}$$

Ans. c

Solution: 8

$I = \frac{M}{V}$ & $B = \mu_0 (H + I) = \mu_0 \left(H + \frac{M}{V}\right)$

$B = 4\pi \times 10^{-7} \times \left[0.5 \times 10^{4} + \frac{5}{10 \times 0.5 \times 0.2 \times 10^{-6}}\right]$

$= 4\pi \times 10^{-7} \times \left[0.005 \times 10^{6} + 5 \times 10^{6}\right]$

$B = 4\pi \times 10^{-7} \times 5.005 \times 10^{6}$

$B = 62.28 \times 10^{-1}$

$B = 6.28\ T$ Ans.

Ans. c

Solution: 9

$$I = \frac{M}{V} = \frac{M}{\left(\frac{m}{\delta}\right)}$$

$$I = \frac{20}{\left(\frac{110\times10^{-3}\ kg}{8\times\frac{10^{-3}\ kg}{10^{-6}\ m^3}}\right)} = \frac{20}{\frac{110}{8}\times10^{-6}} = \frac{20\times8}{110}\times10^{6}$$

$$\boxed{I = 1.45\times10^{6}\ A/m}$$ Ans.

Ans. d

Solution: 10

Diamagnetic materials $0 \leq \mu_r < 1$

Paramagnetic materials $\mu_r > 1$

Ferromagnetic materials $\mu_r >> 1$

Ans. d

For Video Solution of this DPP, Click on below link

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/74

Video Solution on YouTube:- https://youtu.be/_48YAjetnWM

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/56

SUBSCRIBE

@Physicsaholics

@Physicsaholics_prateek

@NEET_Physics
@IITJEE_Physics

physicsaholics.com

Unacademy

CLICK

Chalo Niklo