

"Dissemination of education for knowledge, Science and Culture"

- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Vivekanand College, Kolhapur

(An Empowered Autonomous Institute)

B.Sc. Part- I (Sem-II) - Electricity and Magnetism-II

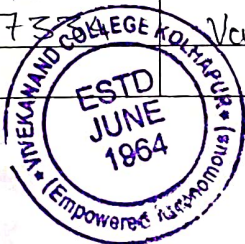
Surprise Test

Attendance Sheet

Department of Physics.

Date: 24/02/2025

Roll No.	Name of Candidate	Sign	
7261	Jiya S. Mulla	J. Mulla	16
7263	Sakshi D. Pakhedkar	S. Pakhedkar	07
7201	Trupti D. Chougale	T. Chougale	14
7256	Diksha V. Sutar	D. Sutar	15
7258	Sakshi G. Chougale	S. Chougale	10
7218	Shivaji Shivaji Kumbhar	S. Kumbhar	07
7227	Prishma Sachin Jipankar	P. Jipankar	08
7332	Shreya Sachin Patil	S. Patil	10
7330	Arpita B. Patil	A. B. Patil	12
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B.Sc. Part- I (Sem-II) - Electricity and Magnetism-II

Surprise Test

Department of Physics

Time: 11.00 am to 11.50 pm

Marks: 20

Day: Saturday

Date: 24/02/2025

Instruction :-

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of log table and calculator is allowed.

Q.1 Select correct alternative

(5) Marks

1) Intensity of magnetisation is _____

- a) Magnetic moment per unit volume of substance.
- b) Magnetic moment per unit area of substance.
- c) Volume per unit magnetic moment.
- d) magnetic moment per unit cross-sectional area.

2) Relation between magnetic susceptibility χ and relative permeability μ_r is given by _____

- a) $\mu_r = 1 + \chi$
- b) $\mu_r = 1 - \chi$
- c) $\chi = 1 + \mu_r$
- d) $\chi = 1 - \mu_r$

3) _____ substances are those which are strongly attracted by magnet.

- a) Diamagnetic
- b) Paramagnetic
- c) Ferromagnetic
- d) None

4) Hysteresis is commonly observed in which of the following materials?

- a) Water
- b) Elastic materials
- c) Magnetic materials
- d) Gases

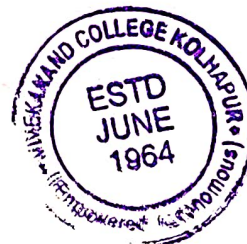
5) Which of the following is NOT an example of hysteresis?

- a) Magnetic hysteresis in iron
- b) Stress-strain behaviour of rubber
- c) Electric field response in dielectric materials
- d) Water flow in a pipe

Q.2 Short answer question (Any Three)

(15) Marks

- i) Explain Magnetic induction.
- ii) Explain magnetic permeability and susceptibility.
- iii) Explain Ferromagnetic material.
- iv) Explain concept of Hysteresis Curve.
- v) Define ferrimagnetic and antiferromagnetic materials.



॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥

- शिक्षणमहर्षी डॉ. बापूजी साबुंखे

27914

Shri Swami Vivekanand Shikshan Sanstha Kolhapur's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

SUPPLIMENT

Suppliment No. : Samuddhi. S. Dixit

Roll No. : 7230

Class : BSc-FY

Signature
of
Supervisor

Subject : Physics (Electricity & Magnetism)

Test / Tutorial No. :

Div. :

10
20

Q1)

D

⇒ ~~b)~~ a) Magnetic moment per unit volume of substance

2)

⇒ ~~e)~~ c) $\chi = 1 + \mu_r$

3)

⇒ ~~e)~~ c) Ferromagnetic

4)

⇒ ~~c)~~ e) Magnetic materials

5)

⇒ ~~b)~~ a) Stress-strain behaviour of rubber



Q2]

ii)

⇒ Magnetic permeability : It is the degree of a or extent at which i) a substance can be magnetized. It is denoted by symbol ' μ_m ' and has different values of permeability for different mediums. i.e. μ_0 = absolute permeability
 $\mu_0 = 4\pi \times 10^{-7} \text{ Nm/C}$

Magnetic susceptibility : It is the ratio of intensity of magnetisation and magnetic intensity and is denoted by X_m .

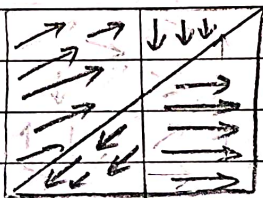
$$X_m = \frac{\text{Intensity of magnetisation}}{\text{Magnetic intensity}}$$

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

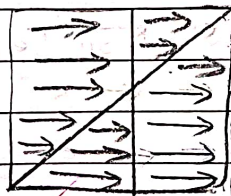
iii)

⇒ Ferromagnetic materials : The materials or substance which are strongly attracted or reactive when placed in a magnetic field are called as Ferromagnetic materials.

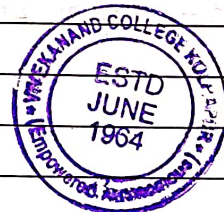
Some ferromagnetic substances act like a magnet ~~even after~~ for some time even after removing the magnetic field. This phenomenon is caused by the alignment of subatomic particles. The spin of the electrons can be shown as follows.



when magnetic field is not applied



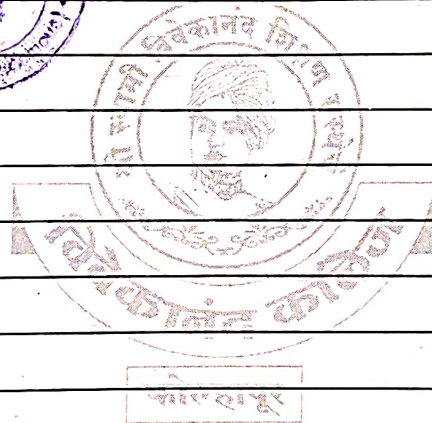
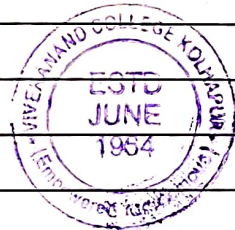
when magnetic field is applied



This shows the flow of magnetic field and magnetisation of the

material before and after passing magnetic field through a ~~ferromagnetic~~ substance / material.

- i) Magnetic induction : It can be defined as the degree or extent at which a substance can sustain ~~when~~ magnetizing field when induced on it. Magnetic induction



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27925

Shri Swami Vivekanand Shikshan Sanstha Kolhapur's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

SUPPLIMENT

Sakshi Sakhedkar

Suppliment No. :

Roll No. : 7263

Class : BSc-I Sem II

Signature
of
Supervisor

Subject : Electricity & Magnetism - II

Test / Tutorial No. : 1

Div. :

Q.1

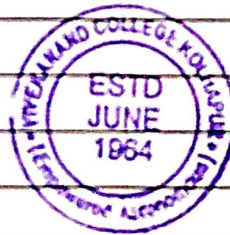
1] Intensity of magnetisation is magnetic moment per unit area of substance

2] Relation between magnetic susceptibility χ & relative permeability μ_r is given by $\mu_r = 1 + \chi$

3] Paramagnetic substances are those which are weakly attracted by magnet.

4] Magnetic materials

5] d] Water flow in a pipe



Q.2

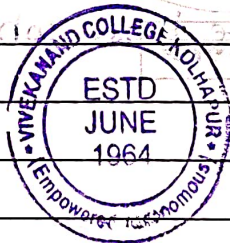
- iii] The materials which are ~~weakly~~ ^{strongly} attracted by magnet such materials are called as ferromagnetic materials.
Exampler of ferromagnetic materials are,
Cobalt, zinc, copper, etc.

- ii] Magnetic Permeability :- Magnetic permeability is denoted by ' μ '.

As, $\mu = \mu_0 \mu_r$

where μ_0 = permeability due to air or free space

μ_r = relative permeability



Trupti Dattatray chougale.

॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥

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27926

Shri Swami Vivekanand Shikshan Sanstha Kolhapur's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

SUPPLIMENT

Suppliment No. :

Roll No. : 7201

Class : BSc.FY

Signature
of
Supervisor

Subject : PHYSICS

Test / Tutorial No. : Surprise Test

Div. :

Q.1

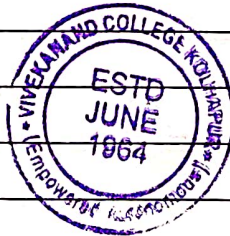
1) a) Magnetic moment per unit volume of substance.

2) d) ~~$\mu = \frac{1}{\mu_0} \mu_0$~~ $\mu_0 = 1 + \chi$

3) c) Ferromagnetic material

4) c) Magnetic materials

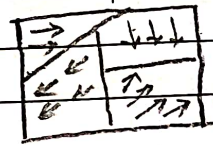
5) d) Water flow in a pipe.



Q.2.

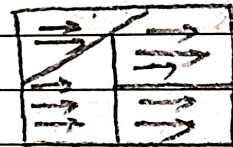
v) Ferromagnetic material.

- 1) Ferromagnetic materials have non-zero ^{net} magnetic moment.
- 2) Ferromagnetic materials have Curie temperature.
- 3) It has hysteresis loop.
- 4) It has high susceptibility.



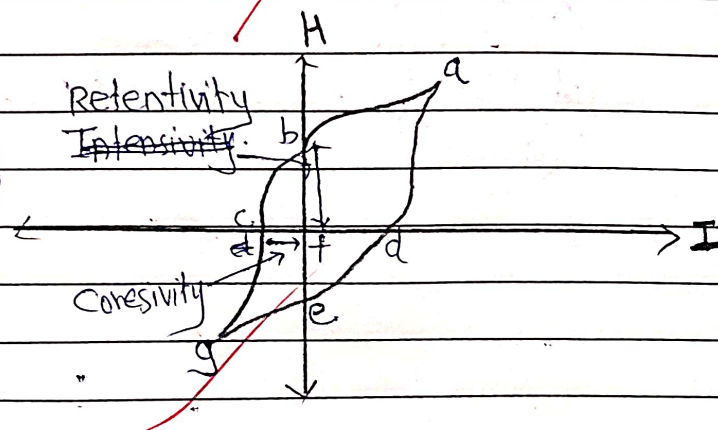
Antiferromagnetic materials -

- 1) Antiferromagnetic materials have zero net magnetisation.
- 2) Antiferromagnetic materials have Nil temperature.
- 3) Antiferromagnetic materials don't have hysteresis loop.
- 4) It has low permeability.



iv) Hysteresis Curve.

The curve of (I-H) known as hysteresis curve. where, I is intensity of magnetisation and H is intensity of magnetic field.



when slowly increases the value of T , then also increases the value of H .

In the figure, the curve OC known as Coersivity and the curve (BE) known as retentivity. In figure, the curve $(abcgeda)$ known as hysteresis curve or hysteresis loop.

(iii) Ferromagnetic material are those which are strongly attracted by a magnet.

Ex. iron, cobalt, Nickel. etc.

ii) magnetic permeability:

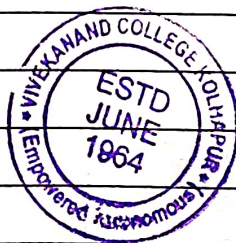
$$\mu = \mu_0 \mu_r$$

μ_0 = magnetic permeability in free space

μ_r = Relative permeability of material.

μ = magnetic permeability.

①



Name :- Matwadkar Anuja Mahadev.

॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥

- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

27891

Shri Swami Vivekanand Shikshan Sanstha Kolhapur's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

SUPPLIMENT

Suppliment No. :

Roll No. : 7329

Class : B.Sc - I

Signature
of
Supervisor

Subject : physics

Test / Tutorial No. :

Div. :

Q.1.

1) Intensity of magnetism is

→ d) magnetic moment per unit cross-sectional area.

2) Relation between magnetic susceptibility χ and relative permeability μ_r is given by -

→ a) $\mu_r = 1 + \chi$

3) _____ substances are those which are strongly attracted by magnet.

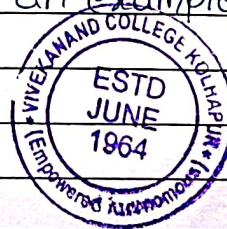
→ c) Ferromagnetic.

4) Hysteresis is commonly observed in which of the following materials?

→ c) Magnetic materials.

5) Which of the following is NOT an example of hysteresis?

→ d) water flow in a pipe.

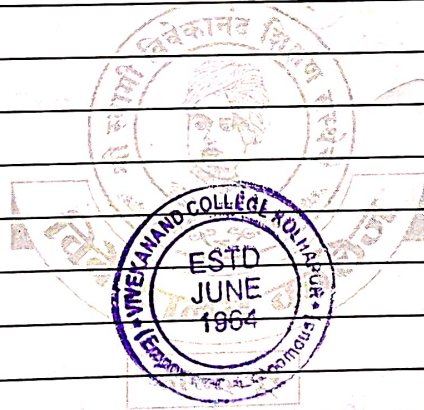


Q.2.

i) Magnetic induction :-

Magnetic induction is the process which changing magnetic field induces an electric field.

ii) The graph of intensity of magnetisation & magnetisation field (H) is known as (τ) Hysteresis curve.



॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥

- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

27923

Shri Swami Vivekanand Shikshan Sanstha Kolhapur's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

SUPPLIMENT

Megha. S. Patil.

Suppliment No. : 01

Roll No. : 7223

Class : B.Sc. FY

Signature
of
Supervisor

Subject : Physics

Test / Tutorial No. :

Div. :

Q 1

1] (d) mag. moment, per unit cross-section.

2] (a) $\mu_r = 1 + \chi$

3] (c) Ferromagnetic

4] (c) Magnetic materials.

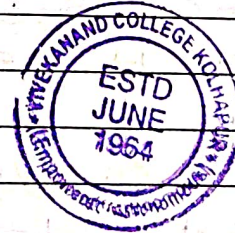
5] (d) water flow in a pipe.

Q 2] (ii)

① Magnetic permeability: It is degree or extent of magnetic material, which shows that how many magnetic lines pass through the material. Denoted by μ .

② Magnetic susceptibility: It is a property which shows that how easily mag. substance can get magnetised. Denoted by χ .

$$\mu_r = 1 + \chi$$



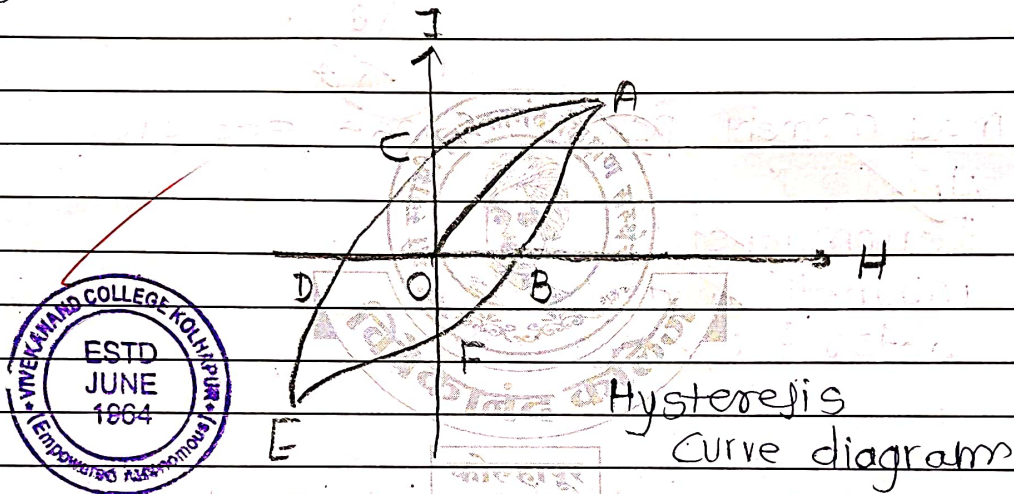
(iii) Ferromagnetic material:

ferromagnetic material are such material which are strongly attracted by magnet.

eg. iron, nickel.

(iv) Hysteresis curve:

The graph of intensity of magnetisation (I) and magnetising field (H) is known as Hysteresis curve.



When magnetising field H we increase then intensity of magnetisation (I) also increases consider a iron bar is put in above.

condition. After some time, As H increase, I also increase and they reach saturation point A. As, if we slowly H decreases then I also decreases, when H becomes zero, I will reach at point C. It will never become zero. So, value of I , at $H=0$, is called retentivity. Further if we increase H in reverse direction,

v] Ferrimagnetic anti-Ferrimagnetic.

There is zero magnetisation.

No hysteresis loop.

The temperature involved is
 Net temperature

phenomenon
(4) used in electrical
home appliances.



Name :- Vaishnari Sandip Chougale

॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥

- शिक्षणमहर्षी डॉ. बापूजी साबुळे

27892

Shri Swami Vivekanand Shikshan Sanstha Kolhapur's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

SUPPLIMENT

Signature
of
Supervisor

Suppliment No. :

Roll No. : 7336

Class : BSC-I

Subject : Physics

Test / Tutorial No. : Surprise Test

Div. :

Q.1.

1] Intensity of magnetisation is ...

→ d] magnetic moment per unit cross-sectional area.

2] Relation between magnetic susceptibility χ and relative permeability μ_r is given by ...

→ a] $\mu_r = 1 + \chi$

3] substances are those which are strongly attracted by magnet.

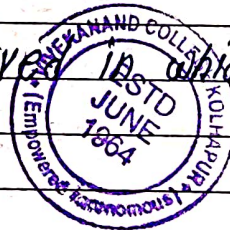
→ c] ferromagnetic.

4] Hysteresis is commonly observed in which of the following materials?

→ ~~b] Water flow in a pipe.~~

c] Magnetic materials.

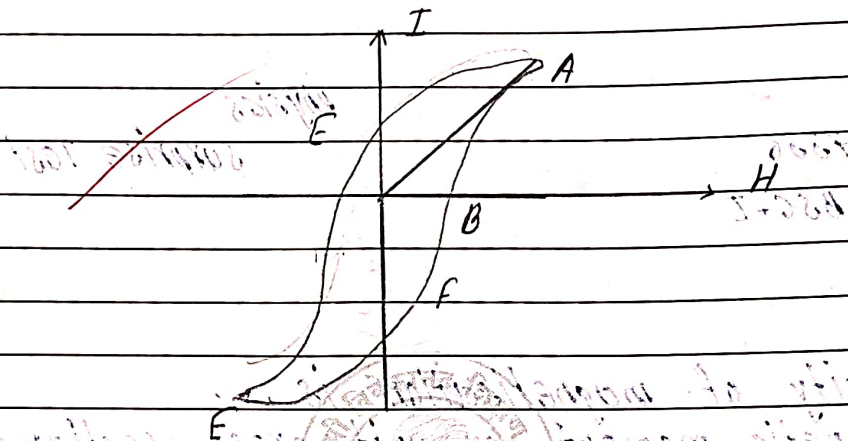
5] Which of the following NOT an example of hysteresis?
d] Water flow in a pipe.



Q.1.

i.v.i Hysteresis curve:

The graph of intensity of magnetisation and magnetising field (H) is known as (T) Hysteresis curve.



13 Ferromagnetic

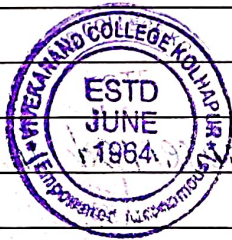
Antiferromagnetic

This is not zero magnetisation.

There is zero magnetisation.

23 Hysteresis curve

presento



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