The Bodwad Sarvajanik Co-Op. Education Society Ltd., Bodwad

Arts, Commerce and Science College, Bodwad.

Question Bank

Class: - F.Y. B.Sc.   **Sem.: -II**

Subject: - Physics   **Paper Name: - Dielectrics, Magnetism and electromagnetism**

1. **When an electric field is applied to a non-polar or polar dielectric material, on the lower surface there exists a net …………**
   A. **Positive charge density**
   B. Negative charge density
   C. Neutral charge density
   D. No charge density

2. **Class of the dielectric material which exhibits a hysteresis loop of polarization versus electric field is termed as….**
   A. **Ferroelectric**
   B. Elecrets
   C. Ferrites
   D. Dipole

3. **A dielectric is always an insulator. But an insulator is not necessarily a dielectric. State True/False**
   A. **True**
   B. False

4. **Identify a good dielectric**
   A. Iron
   B. **Ceramics**
   C. Plastic
   D. Magnesium

5. **A dielectric can be made a conductor by**
   A. Compression
   B. **Heating**
   C. Doping
   D. Freezing

6. **Find the dielectric constant for a material with electric susceptibility of 4.**
   A. 3
   B. **5**
   C. 8
   D. 15

7. **For a dielectric which of the following properties hold good?**
   A. They are superconductors at high temperatures
   B. **They are superconductors at low temperatures**

C. They can never become a superconductor

D. They have very less dielectric breakdown voltage

8. **The magnetic field which destroys the superconductivity is called…**
   A. Diamagnetic field
   B. Ferromagnetic field
   C. Ferrimagnetic field
   D. **Critical field**

9. **The magnetic susceptibility in a superconductor will be…**
   A. Positive
   B. **Negative**
   C. Zero
   D. Infinity

10. **The superconducting materials will be independent of which of the following?**
    A. Magnetic field
    B. **Electric field**
    C. Magnetization
    D. Temperature

11. **Find the mean free path of an electron travelling at a speed of 18m/s in 2 seconds.**
    A. 9
    B. **36**
    C. 0.11
    D. 4.5

12. **What is the process of producing electric dipoles inside the dielectric by an external electric field?**
    a) **Polarisation**
    b) Dipole moment
    c) Susceptibility
    d) Magnetisation

13. **Which of the following easily adapt itself to store electrical energy?**
    a) Passive dielectric
    b) Superconductor
    c) **Active dielectric**
    d) Polar molecules

14. **Which of the following restricts the flow of electrical energy?**
    a) Superconductors
    b) **Passive dielectrics**
    c) Polar molecules
    d) Active dielectric

15. **For non-polar molecules, there is no absorption or emission in the range of infrared.**
    a) **True**
    b) False

16. **How does ionic polarisation occur?**
    a) Splitting of ions
    b) Passing magnetic field
    c) **Displacement of cations and anions**
    d) Never occurs

17. **Polar molecules have permanent dipole moments even in the absence of an electric field.**
    a) False
    b) **True**

18. **Which of the following polarisations is very rapid?**
    a) **Electronic polarisation**
    b) Ionic polarisation
    c) Space charge polarisation
    d) Orientation polarisation

19. **Which of the following is the slowest polarisation method?**
    a) Ionic polarisation
    b) Orientation polarisation
    c) Electronic polarisation
    d) **Space charge polarisation**

20. **When does a dielectric become a conductor?**
    a) At avalanche breakdown
    b) At high temperature
    c) **At dielectric breakdown**
    d) In the presence of magnetic field

21. **Which of the following breakdowns occur at a higher temperature?**
    a) Avalanche breakdown
    b) **Thermal breakdown**
    c) Electrochemical breakdown
    d) Dielectric breakdown

22. **When mobility increases, insulation resistance decreases and dielectric becomes conducting.**
    a) **True**
    b) False

23. **Which of the following materials exhibit Ferro-electricity?**
    a) Iron
    b) Platinum
    c) Hydrogen
    d) **Rochelle salt**

24. **Dielectric materials do not have**
    A. **Free electrons**
    B. Bound charge
    C. Proton
    D. Neutron

25. **When the air in a capacitor is replaced by a medium of dielectric constant K, the capacity**
    A. Deceases K times
    B. **Increases K times**
    C. The K^2 times
    D. Remains constant

26. **The dielectric constant cannot be**
    A. **Infinity**
    B. 5
    C. 6
    D. 7

27. **Material posses electrical polarization in which absence of an applied field and owing to their structure, possess**
    A. **Permanent dipole moment**
    B. Temporary dipole moment
    C. Permanent magnetic
    D. Temporary magnetic

28. **In conductor, opposite charges are separated by,**
    A. Dielectric
    B. Insulator
    C. **Microscopic distance**
    D. Large distance

29. **In the absence of applied electric field in nonpolar dielectrics materials charges are averaged in such a way that**
    A. Opposite charges add each other
    B. **Opposite charges cancel each other**
    C. Similar charges add each other
    D. Similar charges repel each other

30. **Electric susceptibility is inversely proportional to**
    A. **Permittivity**
    B. Polarization Vector
    C. Magnetic field intensity
    D. Permeability

31. **For which of the following is magnetic susceptibility negative?**
    A. Paramagnetic and Ferromagnetic materials
    B. Paramagnetic Materials only
    C. Ferromagnetic Materials only
    D. **Diamagnetic Materials**

32. **Which of the following is the unit of magnetic flux density?**
    A. Weber/meter^2
    B. **Tesla**
    C. Newton/ampere-metre
    D. All of the above

33. **The magnetism of a magnet is due to**
    A. earth
    B. cosmic rays
    C. due to pressure of big magnet inside the earth

D. **spin motion of electrons**

34. **Which of the following materials is the most suitable for making a permanent magnet?**
    A. Soft Iron
    B. Nickel
    C. Copper
    D. **Steel**

35. **Which of the following statements is true about magnetic field intensity?**
    A. Magnetic field intensity is the number of lines of force crossing per unit volume.
    B. Magnetic field intensity is the number of lines of force crossing per unit area.
    C. **Magnetic field intensity is the magnetic induction force acting on a unit magnetic pole**.
    D. Magnetic field intensity is the magnetic moment per unit volume

36. **What happens to the magnetic needle kept in a non-uniform magnetic field?**
    A. **It experiences force but not torque**
    B. It experiences torque but not force
    C. It experiences both force and torque
    D. It neither experiences force nor torque

37. **What happens to the magnetic moment if a hole is made at the centre of a bar magnet?**
    A. Decreases
    B. Increases
    C. **Not a change**
    D. None of the above

38. **Basic source of magnetism _____.**
    A. Charged particles alone
    B. **Movement of charged particles**
    C.   Magnetic dipoles
    D.   Magnetic domains

39. **Units for magnetic flux density**
    A. **Wb / m2**
    B. Wb / A.m
    C.   A / m
    D. Tesla / m

40. **Magnetic permeability has units as**
    A. Wb / m2
    B. **Wb / A.m**
    C. A / m
    D. Tesla / m

41. **Magnetic permeability has units as**
    A. Tesla
    B. Henry
    C. Tesla / m
    D.   **Henry / m**

42. **Magnetic field strength's units are**
    A. Wb / m2
    B. Wb / A.m
    C. **A / m**

D. Tesla / m

43. **Example for dia-magnetic materials**
    A. **super conductors**
    B. alkali metals
    C. transition metals
    D. Ferrites

44. **Example for para-magnetic materials**
    A. super conductors
    B. **alkali metals**
    C. transition metals
    D. Ferrites

45. **Example for ferro-magnetic materials**
    A. super conductors
    B. alkali metals
    C. **transition metals**
    D. Ferrites

46. **Example for anti-ferro-magnetic materials**
    A. **salts of transition elements**
    B. rare earth elements
    C. transition metals
    D. Ferrites

47. **Example for ferri-magnetic materials**
    A. salts of transition elements
    B. rare earth elements
    C. transition metals
    D. **Ferrites**

48. **Magnetic susceptibility para-magnetic materials is**
    A. $+10^{-5}$
    B. -10^{-5}
    C. 10^{5}
    D. 10^{-5} **to** 10^{-2}

49. **Magnetic susceptibility dia--magnetic materials is**
    A. $+10^{-5}$
    B. -10^{-5}
    C. 10^{5}
    D. 10^{-5} to 10^{-2}

50. **Magnetic susceptibility ferro-magnetic materials is**
    A. $+10^{-5}$
    B. -10^{-5}
    C. 10^{5}
    D. 10^{-5} to 10^{-2}

51. **The presence of parallel alignment of magnetic dipole moment is given by which materials?**
    a) Diamagnetic
    b) **Ferromagnetic**

c) Paramagnetic
d) Ferromagnetic

52. **The magnetic materials follow which law?**
    a) Faraday's law
    b) Ampere law
    c) Lenz law
    d) **Curie Weiss law**

53. **In which materials the magnetic anisotropy is followed?**
    a) Diamagnetic
    b) Paramagnetic
    c) **Ferromagnetic**
    d) Ferromagnetic

54. **Piezoelectric effect is analogous to which phenomenon?**
    a) Electrostriction
    b) **Magnetostriction**
    c) Anisotropy
    d) Magnetization

55. **The materials having very small susceptibility at all temperatures are**
    a) **Antiferromagnetic**
    b) Diamagnetic
    c) Ferromagnetic
    d) Paramagnetic

56. **The susceptibility is independent of temperature in which material?**
    a) Paramagnetic
    b) Ferromagnetic
    c) **Diamagnetic**
    d) Ferromagnetic

57. **In ferromagnetic materials the susceptibility is infinity. State True/False**
    a) **True**
    b) False

58. **If a material is ferromagnetic, what shall be the value of χ?**
    a) Negative
    b) Small and positive
    c) **Large and Positive**
    d) Insufficient information

59. **Which of the following is a diamagnetic material?**
    a) Sodium
    b) Calcium
    c) Oxygen (at STP)
    d) **Nitrogen (at STP)**

60. **Which of the following is the correct expression for Curie's law?**
    a) $\chi = C\mu_0 T$
    b) $\boldsymbol{\chi = C\mu_0/T}$
    c) $\mu_0 = C\chi T$
    d) $\mu_0 = C\chi/T$

61. **Curie's law is applicable at every point on a Paramagnetic Material.**
    a) True
    b) **False**

62. **The phenomenon of perfect diamagnetism is called _____**
    a) Superconductivity
    b) Diamagnetic Effect
    c) Zero Kelvin Effect
    d) **Meissner Effect**

63. **Materials in which magnetization persists even after the field has been removed are called _____**
    a) **Diamagnetic**
    b) Paramagnetic
    c) Soft Ferro magnets
    d) **Hard Ferro magnets**

64. **Superconductors are diamagnetic materials.**
    a) **True**
    b) False

65. **Which of the following is not a constituent of Alnico?**
    a) Iron
    b) Aluminum
    c) **Magnesium**
    d) Copper

66. **At high temperature a Ferro magnet becomes _____**
    a) Diamagnetic
    b) **Paramagnetic**
    c) Hard Ferro magnet
    d) Soft Ferro Magnet

67. **Which material is shown in the figure?**
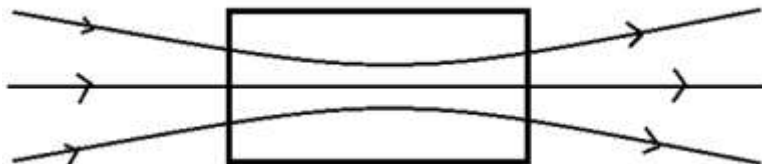
    a) Diamagnetic Material
    b) **Paramagnetic Material**
    c) Ferromagnetic Material
    d) Non-Magnetic Material
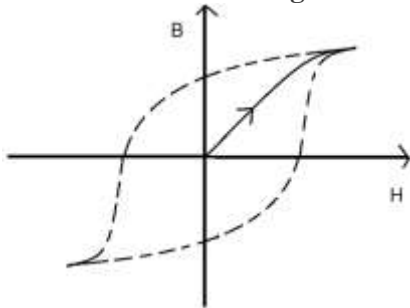
68. **The value of B at H=0 in a Hysteresis curve is called _____**
    a) **Remanence**
    b) Coercivity
    c) Magnetization
    d) Porosity

69. **When a ferromagnetic rod is placed in a solenoid with current, what happens to the rod?**
    a) Retentivity increases
    b) Coercivity Increases
    c) **Permanently Magnetized**
    d) Nothing

70. **What does the following curve show?**

    a) Magnetization curve
    b) **Hysteresis curve**
    c) Polarizing curve
    d) Coercive Curve

71. **Which of the following conditions are desired in the core of an electromagnet?**
    a) High permeability and High retentivity
    b) Low permeability and High retentivity
    c) **High permeability and Low retentivity**
    d) Low permeability and Low retentivity

72. **An E.M.F. can be induced by _____**
    a) Change in the magnetic field only
    b) Change in the area of cross section only
    c) Change in angle between magnetic field and area only
    d) **Change in the magnetic field, area or angle between them**

73. **What happens to the current in a coil while accelerating a magnet inside it?**
    a) **Increases**
    b) Decreases
    c) Remains constant
    d) Reverses

74. **What is the consequence of motor effect?**
    a) Current
    b) Voltage
    c) **Electromagnetic induction**
    d) EMF

75. **The total number of magnetic field lines passing through an area is termed as?**
   a) Voltage
   b) EMF
   c) **Magnetic flux**
   d) Magnetic flux density

76. **The formula for induced emf if magnetic field, length and velocity of conductor all are mutually perpendicular is _____**
   a) emf=B^2l
   b) emf=Bil
   c) **emf=Blv**
   d) emf=B^2v

77. **What does emf stand for?**
   a) Electronic magnetic force
   b) **Electromotive force**
   c) Electromagnetic force
   d) Electromated force

78. **What is emf?**
   a) Force
   b) **Voltage**
   c) Current
   d) Flux

79. **Whenever the magnetic flux linked with an electric circuit changes, an emf is induced in the circuit. This is called**
   (a) **electromagnetic induction**
   (b) lenz's law
   (c) hysteresis loss
   (d) kirchhoff's laws

80. **In electromagnetic induction, the induced charge is independent of**
   (a) change of flux
   (b) **time.**
   (c) resistance of the coil
   (d) None of these

81. **An induced e.m.f. is produced when a magnet is plunged into a coil. The strength of the induced e.m.f. is independent of**
   (a) the strength of the magnet
   (b) number of turns of coil
   (c) **the resistivity of the wire of the coil**
   (d) speed with which the magnet is move

82. **According to Faraday's law of electromagnetic induction**
   (a) **electric field is produced by time varying magnetic flux.**
   (b) magnetic field is produced by time varying electric flux.
   (c) magnetic field is associated with a moving charge.
   (d) None of these

83. **A moving conductor coil produces an induced e.m.f. This is** in accordance with
    (a) Lenz's law
    (b) **Faraday's law**
    (c) Coulomb's law
    (d) Ampere's law

84. **A coil of insulated wire is connected to a battery. If it is taken to galvanometer, its pointer is deflected, because**
    (a) **the induced current is produced**
    (b) the coil acts like a magnet
    (c) the number of turns in the coil of the galvanometer are changed
    (d) None of these

85. **The polarity of induced emf is given by**
    (a) Ampere's circuital law
    (b) Biot-Savart law
    (c) **Lenz's law**
    (d) Fleming's right hand rule

86. **The self inductance of a coil is a measure of**
    (a) **electrical inertia**
    (b) electrical friction
    (c) induced e.m.f.
    (d) induced current

87. **The coils in resistance boxes are made from doubled insulated wire to nullify the effect of**
    (a) heating
    (b) magnetism
    (c) pressure
    (d) **self induced e.m.f.**

88. **Two pure inductors each of self inductance L are connected in series, the net inductance is**
    (a) L
    (b) **2 L**
    (c) L/2
    (d) L/4

89. **Lenz's law is a consequence of the law of conservation of**
    (a) charge
    (b) mass
    (c) **energy**
    (d) momentum

90. **A magnet is moved towards a coil (i) quickly (ii) slowly, then the induced e.m.f. is**
    (a) **larger in case (i)**
    (b) smaller in case (i)
    (c) equal to both the cases
    (d) larger or smaller depending upon the radius of the coil

91. **The laws of electromagnetic induction have been used in the construction of a**
    (a) galvanometer

(b) voltmeter
(c) electric motor
(d) **generator**

92. Two coils are placed closed to each other. The mutual inductance of the pair of coils depends upon
(a) the rate at which currents are changing in the two coils.
(b) **relative position and orientation of two coils.**
(c) the material of the wires of the coils.
(d) the currents in the two coils.

93. Two identical coaxial circular loops carry a current i each circulating in the same direction. If the loops approach each other, you will observe that the current in
(a) each increases
(b) **each decreases**
(c) each remains the same
(d) one increases whereas that in the other decreases

94. When current in a coil changes from 5 A to 2 A in 0.1 s, average voltage of 50 V is produced. The self-inductance of the coil is
(a) **1.67 H**
(b) 6 H
(c) 3 H
(d) 0.67 H

95. The self inductance associated with a coil is independent of
(a) current
(b) induced voltage
(c) time
(d) **resistance of a coil**

96. A coil having 500 sq. loops of side 10 cm is placed normal to magnetic flux which increases at a rate of 1 T/s. The induced emf is
(a) 0.1 V
(b) 0.5 V
(c) 1 V
(d) **5 V**

97. A coil of 100 turns carries a current of 5 mA and creates a magnetic flux of 10^{-5} weber. The inductance is
(a) 0.2 mH
(b) 2.0 mH
(c) **0.02 mH**
(d) 0.002 H

98. The north pole of a long bar magnet was pushed slowly into a short solenoid connected to a short galvanometer. The magnet was held stationary for a few seconds with the north pole in the middle of the solenoid and then withdrawn rapidly. The maximum deflection of the galvanometer was observed when the magnet was
(a) moving towards the solenoid
(b) moving into the solenoid
(c) at rest inside the solenoid
(d) **moving out of the solenoid**

99. **The current flows from A to B is as shown in the figure. The direction of the induced current in the loop is**
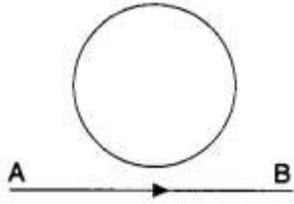

   (a) **clockwise.**
   (b) anticlockwise.
   (c) straight line.
   (d) no induced e.m.f. produced.

100. **In a coil of self-induction 5 H, the rate of change of current is 2 As-1. Then emf induced in the coil is**
   (a) 10 V
   (b) **-10 V**
   (c) 5 V
   (d) -5 V

101. **Two identical coaxial coils P and Q carrying equal amount of current in the same direction are brought nearer. The current in**
   (a) P increases while in Q decreases
   (b) Q increases while in P decreases
   (c) both P and Q increases
   (d) **both P and Q decreases**

102. **Faraday's laws are consequence of the conservation of**
   (a) charge
   (b) **energy**
   (c) magnetic field
   (d) both (b) and (c)

103. **Direction of current induced in a wire moving in a magnetic field is found using**
   (a) Fleming's left hand rule
   (b) **Fleming's right hand rule**
   (c) Ampere's rule
   (d) Right hand clasp rule

104. **Which of the following statements is not correct?**
   (a) Whenever the amount of magnetic flux linked with a circuit changes, an emf is induced in circuit.
   (b) The induced emf lasts so long as the change in magnetic flux continues.
   (c) The direction of induced emf is given by Lenz's law.
   (d) **Lenz's law is a consequence of the law of conservation of momentum.**

105. **Lenz's law is a consequence of the law of conservation of**
   (a) charge
   (b) **energy**
   (c) induced emf
   (d) induced current

106. **A solenoid is connected to a battery so that a steady current flows through it. If an iron core is inserted into the solenoid, the current will**
   (a) increase
   (b) **decrease**

(c) remain same

(d) first increase then decrease

107. **There is a uniform magnetic field directed perpendicular and into the plane of the paper. An irregular shaped conducting loop is slowly changing into a circular loop in the plane of the paper. Then**

(a) **current is induced in the loop in the anti-clockwise direction**.

(b) current is induced in the loop in the clockwise direction.

(c) ac is induced in the loop.

(d) no current is induced in the loop.

108. **In the given figure current from A to B in the straight wire is decreasing. The direction of induced current in the loop is A**

(a) clockwise

(b) **anticlockwise**

(c) changing

(d) nothing can be said

109. **Which of the following does not use the application of eddy current?**

(a) Electric power meters

(b) Induction furnace

(c) **LED lights**

(d) Magnetic brakes in trains

110. **The north pole of a bar magnet is rapidly introduced into a solenoid at one end (say A). Which of the following statements correctly depicts the phenomenon taking place?**

(a) No induced emf is developed.

(b) The end A of the solenoid behaves like a south pole.

(c) **The end A of the solenoid behaves like north pole.**

(d) The end A of the solenoid acquires positive potential.

111. **A metal plate can be heated by**

(a) passing either a direct or alternating current through the plate.

(b) placing in a time varying magnetic field.

(c) placing in a space varying magnetic field, but does not vary with time.

(d) **both (a) and (b) are correct.**

112. **Identify the wrong statement.**

(a) **Eddy currents are produced in a steady magnetic field.**

(b) Eddy currents can be minimized by using laminated core.

(c) Induction furnace uses eddy current to produce heat.

(d) Eddy current can be used to produce braking force in moving trains.

113. **If number of turns in primary and secondary coils is increased to two times each, the mutual inductance**

(a) **becomes 4 times**

(b) becomes 2 times

(c) becomes A times

(d) remains unchanged 4

114. **When the rate of change of current is unity, the induced emf is equal to**
(a) thickness of coil
(b) number of turns in coil
(c) **coefficient of self inductance**
(d) total flux linked with coil

115. **Two inductors of inductance .L each are connected in series with opposite? magnetic fluxes. The resultant inductance is (Ignore mutual inductance)**
(a) zero
(b) L
(c) **2L**
(d) 3L

116. **A square of side L metres lies in the x-y plane in a region, where the magnetic field is given by B = B_0{li + 3j + 4k) T, where Bo is constant. The magnitude of flux passing through the square is**
(a) $2B_oL^2$ Wb.
(b) $3B_oL^2$ Wb.
(c) **$4B_oL^2$ Wb.**
(d) $\sqrt{29}$ B_oL^2 Wb.

117. **An e.m.f is produced in a coil, which is not connected to an external voltage source. This is not due to**
(a) the coil being in a time varying magnetic field.
(b) the coil moving in a time varying magnetic field.
(c) the coil moving in a constant magnetic field.
(d) **the coil is stationary in external spatially varying magnetic field, which does not change with time.**

118. **There are two coils A and B as shown in Figure. A current starts flowing in B as shown, when A is moved towards B and stops when A stops moving. The current in A is counterclockwise. B is kept stationary when A moves. We can infer that [NCERT Exemplar]**
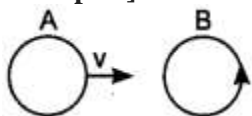
(a) there is a constant current in the clockwise direction in A.
(b) there is a varying current in A.
(c) there is no current in A.
(d) **there is a constant current in the counter clockwise direction in A.**

119. **Same as question 4 except the coil A is made to rotate about a vertical axis (Figure). No current flows in B if A is at rest. The current in coil A, when the current in B (at t = 0) is counterclockwise and the coil A is as shown at this instant, t = 0, is [NCERT Exemplar]**
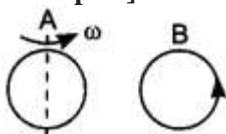
(a) **constant current clockwise.**
(b) varying current clockwise.

(c) varying current counterclockwise.
(d) constant current counterclockwise.

120. Eddy currents do not cause
    (a) damping
    (b) heating
    (c) **sparking**
    (d) loss of energy

121. The velocity of a charged particle to keep moving in the same direction, in a region where electric and magnetic fields are perpendicular to each other, is _____
    a) **E/B**
    b) B/E
    c) E/B + qE/B
    d) B/E + qB/E

122. The entire theory of electromagnetic waves is contained in Maxwell's equations.
    a) **True**
    b) False

123. Differential form of Gauss's law in magneto statics is _____
    a) div B = ρ/ε_o
    b) **div B = 0**
    c) div B = -dB/dT
    d) div B = μJ

124. Magnetic field can be produced by _____
    a) Conduction current
    b) Displacement current
    c) **Both conduction and displacement current**
    d) It is produced naturally

125. In vacuum or free space, what observations are made?
    a) $\rho = \rho_o$, J = 0
    b) $\rho = 0$, J = J_o
    c) **$\rho = 0$, J = 0**
    d) $\rho = \rho_o$, J = J_o

126. Which of the following is the expression for the continuity equation?
    a) ρ + J = 0
    b) dρ/dt + div.J = 0
    c) dρ/dt + J = 0
    d) ρ + div J = 0

127. The divergence of which quantity will be zero?
    a) E
    b) D
    c) H
    d) **B**

128. Find the Maxwell equation derived from Faraday's law.
    a) Div(H) = J
    b) Div(D) = I

c) **Curl(E) = -dB/dt**
d) Curl(B) = -dH/dt

129. **Find the Maxwell law derived from Ampere law.**
    a) Div(I) = H
    b) Div(H) = J
    c) **Curl(H) = J**
    d) Curl(B) = D

130. **The Faraday's law states about which type of EMF?**
    a) **Transformer EMF**
    b) Back EMF
    c) Generator EMF
    d) Secondary EMF

131. **In which of the following forms can Maxwell's equation not be represented?**
    a) **Static**
    b) Differential
    c) Integral
    d) Harmonic.