



FEDERAL UNIVERSITY OYE-EKITI
DEPARTMENT OF PHYSICS

Second Semester Examination 2015/2016 Academic Session
PHY 102: General Physics II 3 Credit Unit

INSTRUCTION: Circle your chosen answer with pen
Department _____

Time allowed: 1 Hr

Matric Number _____

102

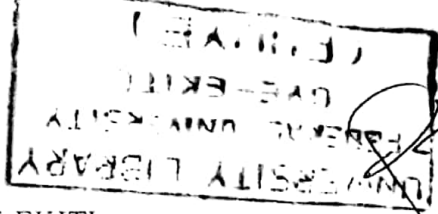
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Library

1. The enclosed charge in Maxwell's equation can be determined by considering
A. Charge density B. Flux C. Surface area D. Charge dimension
2. A line charge with linear charge density $\lambda = 10^{-12}$ C/m passes through the center of a sphere. If the flux through the surface of the sphere is 1.13×10^{-3} Vm, what is the radius R of the sphere?
A. 4×10^{-3} m B. 1×10^{-3} m C. 5×10^{-3} m D. 7×10^{-3} m
3. The integral form of Ampere's law for electricity is
A. $\oint_S B \cdot dA = \epsilon_0 I_{\text{enclosed}}$ B. $\oint_S B \cdot dA = \mu_0 q_{\text{enclosed}}$ C. $\oint_S B \cdot dA = \mu_0 I_{\text{enclosed}}$ D. $\oint_S B \cdot dA = \epsilon_0 q_{\text{enclosed}}$
4. The divergence of magnetic field as in gauss's law in differential form can be equal to zero provided there is no
A. Current density B. Charge density C. Area charge density D. Linear charge density
5. An electron in a TV camera tube is moving at 7.60×10^6 m/s in a magnetic field of strength 83.0 mT. At one point, the electron has an acceleration of magnitude 4.70×10^{14} m/s². The angle between the velocity and magnetic field is
A. 0.52° B. 52° C. 0.24° D. 24°
6. Lenz's law is the consequence of the law of conservation of
A. Charge B. Energy C. Field lines D. Momentum
7. The emf induced in a coil due to the changing current of another neighboring coil is called
A. Dynamically induced emf B. Self-induced emf C. Statically induced emf D. Mutually induced emf
8. What do you call the characteristic of a magnetic material whereby a change in magnetization lags the application of a magnetizing force?
A. Hysteresis B. Induction C. Retentivity D. Reluctance
9. Three capacitors (3.0 μ F, 5.0 μ F and 8 μ F) are connected in series. What is their equivalent capacitance?
A. 16 μ F B. 1.52 μ F C. 16 F D. 120 μ F
10. Two capacitors (0.2 μ F and 0.6 μ F) are connected in parallel. A charge of 200 μ C is now placed on the parallel combination. What is the potential difference across it?
A. 0.16 KV B. 8.0 KV C. 40 KV D. 0.25 KV
11. Filtering out unwanted frequency signals is one of the applications of
A. Resistor B. Capacitor C. Transistor D. Inductor
12. In parallel plate capacitor, the Capacitance C is inversely proportional to the distance of separation.
A. True B. False C. Not known D. All of the above
13. The electromagnet has 50 turns and a current of 1A flows through the coil. If the length of the magnetic circuit is 200mm, what is the magnetic field strength?
A. 2500 AT/m B. 25AT/ C. 250AT/m D. 2.5 AT/m
14. A capacitor of capacitance 3.0 μ F is subjected to a 2000 V potential difference across its terminals. Calculate the energy stored in the capacitor.
A. 18000 J B. 1.5 J C. 6000 J D. 6 J
15. How much work is required to carry an electron from the positive terminal of a 12-V battery to the negative terminal?
A. 1.9×10^{-16} J B. -1.9×10^{-18} J C. 1.6×10^{-17} J D. 1.2×10^{-18} J
16. Which of these systems has the most negative charge?
A. 2 electrons B. 3 electrons and 1 proton C. 5 electrons and 5 protons D. N electrons and N-3 electrons
17. If magnetic flux density and current are at right angles, then component of force acting on conductor is
A. $BIL \tan \theta$ B. $BIL \sin \theta$ C. $BIL \cos \theta$ D. $BL \sin \theta$
18. Whenever a conductor cuts magnetic flux, an emf is induced in it. This is known as
A. Coulomb's law B. Faraday's law C. Joule's law D. Ohm's law
19. The following are measurable quantities to define magnetic field EXCEPT
A. Charge B. Velocity C. The deflecting force D. Torque

20. The property of a substance to oppose or restrict the flow of electricity through it is called
 A. Conductance B. Inductance C. Capacitance **D. Resistance**
21. Calculate the electric field intensity at a point 15cm from a charge $10\text{ }\mu\text{C}$.
 A. $3 \times 10^6\text{ NC}^{-1}$ B. $1.5 \times 10^6\text{ NC}^{-1}$ C. $4 \times 10^6\text{ NC}^{-1}$ D. $6 \times 10^5\text{ NC}^{-1}$
22. Two long parallel conductors carry a current of 100A each. If the conductors are separated by 20 per meter of length of each conductor will be
 A. 100 N/m B. 10 N/m C. 0.1 N/m D. 1 N/m
23. A capacitor charged to 200 V has $2000\text{ }\mu\text{C}$ of charge. The value of capacitance will be
 A. 10F B. $100\text{ }\mu\text{F}$ C. $1000\text{ }\mu\text{F}$ **D. $10\text{ }\mu\text{F}$**
24. Charging an object without direct contact with it is known as charging by
 A. Convection B. Induction C. Conduction D. Reaction
25. Which of the following is NOT one of the fundamental forces?
 A. Gravity B. Electromagnetism C. Frictional **D. Strong**
26. The magnetic flux ϕ_B through the loop is given by
 A. $\oint \mathbf{B} \cdot d\mathbf{A}$ B. $\oint \mathbf{B} \cdot d\mathbf{E}$ C. $\nabla \cdot \mathbf{D}$ D. $\nabla \cdot \mathbf{E}$
27. The equation $\mathbf{F} = q(\mathbf{E} + \mathbf{V} \times \mathbf{B})$ is termed as
 A. Magnetic force B. Electric force C. Force square law **D. Lorentz force law**
28. A coil made of 500 turns of wire is placed with its plane perpendicular magnetic field which changes 0.85 T within 0.6secs. If the diameter of the wire is 12 cm, what is the EMF induced in the coil?
 A. 3.00 volts B. 45.6 volts C. 33.0 volts D. 62.4 volts
29. A transformer is designed to convert a 30 V supply to an output of 230 V. Assuming that the transformer is efficient, calculate the current in the primary windings when the output terminals are connected to a lamp.
 A. 320 A B. 392A C. 34.6 A D. 3.92 A
30. The unit of magnetic induction is
 A. Ampere B. Tesla **C. Henry** D. Farad
31. Which of the following is not a method/instrument of measuring resistance?
 A. Wheatstone bridge B. Meter bridge C. Substitution D. Bridge divider
32. Two equal but opposite charges are held 40cm apart on the x-axis. If the magnitude of each is $2.25 \times 10^{-6}\text{ C}$, calculate the electric field midway between the charges. ($k = 9 \times 10^9\text{ Nm}^2/\text{C}^2$)
 A. $2.25 \times 10^6\text{ N/C}$ B. $4.5 \times 10^6\text{ N/C}$ C. $20 \times 10^6\text{ N/C}$ D. $2.25 \times 10^5\text{ N/C}$
33. What is the magnitude of the electric field, E such that an electron placed in the field would feel an electrical force equal to its weight? (Take $g = 9.8\text{ ms}^{-2}$, $m_e = 9.1 \times 10^{-31}\text{ kg}$, $e = 1.6 \times 10^{-19}\text{ C}$)
 A. $4 \times 10^{-10}\text{ N/C}$ B. $5.6 \times 10^{-11}\text{ N/C}$ C. 9.8 N/C D. None of the above
34. A thin-walled metal sphere has a radius of 20cm and carries a charge of $6\text{ }\mu\text{C}$. Find the electric field inside the sphere.
 A. $1.35 \times 10^{-6}\text{ N/C}$ B. 0 C. $1 \times 10^{-6}\text{ N/C}$ D. None of the above
35. The space outside the magnet where its pole has a force of attraction or repulsion on a magnetic pole is called
 A. Free Space Field B. Electric field C. Electromagnetic field D. Magnetic field
36. Who stated the law that whenever there is a change in magnetic flux linked with a circuit, an EMF is induced in the circuit?
 A. Fleming B. Newton C. Faraday D. Lenz
37. The $\int_0^t i dt$ gives -----
 A. current B. Quantity of charges C. Potential difference D. Resistance
38. Which of the following does not affect the resistance of a wire?
 A. Cross sectional area B. Temperature C. Potential difference D. Nature of the material
39. For resistors in parallel, which of the following is the same?
 A. Current B. Power C. Resistance D. Voltage
40. The resistivity of a given piece of uniform wire of length 2.0 m is $5.4 \times 10^{-7}\text{ }\Omega\text{m}$. If the cross section of the wire is $9.5 \times 10^{-3}\text{ cm}^2$, calculate the resistance of the wire.
 A. 10.8 Ω B. 0.10 Ω C. 2.28 V D. 1.14 Ω

PHY 102



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B.Sc. Second Semester Examination 2016/2017 Academic Session

PHY 102: General Physics II

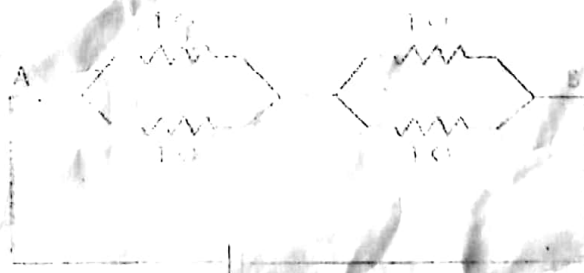
3 Credit Unit

Time allowed: 1½ hr

INSTRUCTION: Tick your answers on the answer sheet

- Filtering out unwanted frequency signals is one of the applications of
(a) Resistor (b) Capacitor (c) Transistor (d) Inductor (e) insulator
- The higher the self-inductance of a coil
(a) the lesser it weber-turns (b) the lower the emf induced (c) the greater the flux produced by it
(d) the longer the delay in establishing steady current through it (e) a and b
- The electron and proton of a hydrogen atom are separated (on the average) by a distance of approximately $5.3 \times 10^{-11} \text{ m}$. Find the magnitudes of the electric force.
(a) $5.3 \times 10^{-8} \text{ N}$ (b) $9.6 \times 10^{-8} \text{ N}$ (c) $8.2 \times 10^{-8} \text{ N}$ (d) $11.4 \times 10^{-6} \text{ N}$ (e) $3.3 \times 10^{-9} \text{ N}$
- Calculate the cyclotron frequency of an electron of mass $9.11 \times 10^{-31} \text{ kg}$ and charge $1.6 \times 10^{-19} \text{ C}$ circulating in a plane at right angle to a uniform magnetic field B of magnitude $2.0 \times 10^{-4} \text{ T}$.
(a) $3.2 \times 10^{-23} \text{ Hz}$ (b) $5.72 \times 10^{-30} \text{ Hz}$ (c) $5.59 \times 10^6 \text{ Hz}$ (d) $1.82 \times 10^{-34} \text{ Hz}$ (e) $1.59 \times 10^6 \text{ Hz}$
- A positive test charge of $3.0 \times 10^{-8} \text{ C}$ is placed in a place where it experiences a force $F = 6.0 \times 10^{-8} \text{ N}$ Calculate the electric field the charge experiences
(a) 2 N/C (b) 18 N/C (c) 9 N/C (d) 6 N/C (e) 8 N/C
- The total electric flux over any closed surface is
(a) ϵ_0 (b) q^2/ϵ_0 (c) ϵ_0/q (d) q/ϵ_0 (e) $q\epsilon_0$
- The electric potential at points in an xy plane is given by $V = 2x^2 - 3y^2$. The magnitude and direction of the electric field at the point (3.0 m, 2.0 m) respectively are:
(a) 25 Vm^{-1} and 45° (b) 17 Vm^{-1} and 135° (c) 38 Vm^{-1} and 150° (d) 42 Vm^{-1} and 35° (e) 45 Vm^{-1} and 75°
- The resistance across AB in the is circuit below is

$$\frac{1 \times 1}{1+1} = \frac{1}{2}$$



- (a) 1Ω (b) 2Ω (c) 0.5Ω (d) 4Ω (e) 3Ω
- A magnetic field is given by the expression $B = ax\hat{i} + by\hat{j} + cz\hat{k}$, use differential form of gauss law for magnetic field to find 'a'
(a) $a = b$ (b) $a = c$ (c) $a = -b$ (d) $a = -c$ (e) $a = 2b$
- The magnetic flux ϕ_B through the loop is given by
(a) $\oint B \cdot d\vec{A}$ (b) $\oint B \cdot d\vec{E}$ (c) $\nabla \cdot D$ (d) $\nabla \cdot E$ (e) $\oint E \cdot dD$
- How much energy is stored in a 20-mH coil when it carries a current of 0.2A?
(a) $4 \times 10^{-3} \text{ J}$ (b) $4 \times 10^{-4} \text{ J}$ (c) $0.4 \times 10^{-4} \text{ J}$ (d) $6.4 \times 10^{-6} \text{ J}$ (e) $7 \times 10^{-3} \text{ J}$
- A point charge -10^{-6} C is situated in air at the origin of a rectangular coordinate system, a second charge $+10^{-6} \text{ C}$ situated at a distance of 50cm from the origin. Calculate the force on the second charge.

- (a) +3.6 N (b) -3.6 N (c) -10 N (d) +10 N (e) -1.0 N
13. The magnetic flux through a loop increases according to the relation $\Phi = 6t^2 + 7t$ in milliweber and in seconds. Find the magnitude of the emf induced in the loop when $t = 2$ seconds.
(a) 0.024 V (b) 2400 V (c) 0.020 V (d) 200 V (e) 0.094 V
14. An air cored coil of self-inductance L has N turns of fine insulated copper wire wound on a former of section area A . If the area and number of turns are doubled and the core is a medium of relative permeability 1000, the self-inductance of the coil will be
(a) $8000 L$ (b) $4000 L$ (c) $8 \times 10^{-3} L$ (d) $4 \times 10^{-3} L$ (e) L
15. The $\int_0^t i dt$ gives ----- through the plane or material in a time interval extending from 0 to t .
(a) Resistance (b) quantity of charges (c) Current (d) Potential difference (e) Field
16. A particle initially moving north in a vertically downward magnetic field is deflected toward east. What is sign of the charge on the particle?
(a) Positive (b) Negative (c) Neutral (d) Electron (e) Oscillatory
17. The total electric flux through a closed surface depends
(a) On the location of the charge only (b) on the shape of the closed surface only (c) on the value of the charge only (d) on both the location of the charge and the shape of the surface (e) all of the above
18. Two identical conducting small spheres are placed with their centers 0.300 m apart. One is given a charge 12.0 nC and the other a charge of -18.0 nC. Find the electric force exerted by one sphere on the other.
(a) $8.5 \times 10^6 N$ (b) $6.5 \times 10^{-6} N$ (c) $5.5 \times 10^{-7} N$ (d) $7.1 \times 10^{-6} N$ (e) $1.5 \times 10^{-3} N$
19. An infinite nonconducting sheet has a surface charge density $\sigma = 0.10 \mu C m^{-2}$ on one side. How far apart equipotential surfaces whose potentials differ by 50 V?
(a) 76 mm (b) 58 mm (c) 88 mm (d) 95 mm (e) 68 mm
20. A 100 turn coil whose resistance is 6Ω encloses an area of $80 cm^2$. How rapidly should a magnetic field parallel to its axis change in order to induce a current of 1 mA in the coil?
(a) $0.0075 Ts^{-1}$ (b) $75.0 Ts^{-1}$ (c) $0.75 Ts^{-1}$ (d) $0.0075 V$ (e) $0.0085 Ts^{-1}$
21. A capacitor of capacitance $3.0 \mu F$ is subjected to a 2000 V potential difference across its terminals. Calculate the energy stored in the capacitor.
(a) 13000 J (b) 6 J (c) 6000 J (d) 1.5 J (e) 150 J
22. Object A has a charge of $+2 \mu C$, and object B has a charge of $+6 \mu C$. Which statement is true about the forces on the objects?
(a) $F_{AB} = -3F_{BA}$ (b) $F_{AB} = -F_{BA}$ (c) $3F_{AB} = -F_{BA}$ (d) $F_{AB} = 3F_{BA}$ (e) $F_{AB} = F_{BA}$
23. Mutual inductance between two magnetically coupled coils depends on
(a) Permeability of the coil (b) The number of turns (c) Cross-sectional area of their common core (d) All of the above (e) a and b
24. Two electric fields $E_1 = 3.00 N/C$ and $E_2 = 2.00 N/C$ at right angles in a plane. Calculate the net electric field direction at a point P in the plane.
(a) $3.61 N/C$ and 33.7° (b) $3.61 N/C$ and 42° (c) $5 N/C$ and 33.7° (d) $5 N/C$ and 42° (e) $5.61 N/C$ and 22.7°
25. A circular coil of 160 turns has a radius of 1.90 cm. What value of current results in magnetic dipole moment $2.30 Am^2$?
(a) $1.134 \times 10^{-2} A$ (b) 0.0805 A (c) 12.78 A (d) 1.3 A (e) 5.67 A
26. Which of these formulae is incorrect?
(a) $\sigma = \frac{q}{A}$ (b) $\sigma = \frac{E}{\epsilon_0}$ (c) $E = \frac{V}{L}$ (d) $E = \frac{F}{q}$ (e) $\sigma = \frac{F}{A}$
27. For a given configuration of charges, a set of points where the electric potential $V(r)$ has a given value which it takes no work to move a charged particle from one point to another is known as:
(a) Inter parallel potential surface (b) Interpolar potential surface (c) Equipotential surface (d) Semipotential surface (e) Multi parallel potential surface
28. Two $+2 \mu C$ point charges are located on the x axis. One is at $x = 1.00 m$, and the other is at $x = -1.00 m$. Determine the electric field on the y axis at $y = 0.500 m$.
(a) $4.2 \times 10^6 N/C$ (b) $6.3 \times 10^4 N/C$ (c) $1.6 \times 10^4 N/C$ (d) $4.7 \times 10^4 N/C$ (e) $6.2 \times 10^6 N/C$

- Calculate the inductance of a solenoid containing 250 turns if the length of the solenoid is 20.0cm and its cross-sectional area is $4.00 \times 10^{-3} \text{ m}^2$.
- (a) 0.0157 mH (b) 15.7 mH (c) 0.157 mH (d) 0.157 H (e) 18.7 mH
30. Which of the following mathematical expression is a Lorentz equation for magnetic field
- (a) $\vec{F} = q\vec{V} \times \vec{B}$ (b) $\vec{F}_s = q\vec{B} \times \vec{V}$ (c) $\vec{F} = q\vec{B} \times \vec{V}$ (d) $\vec{F}_B = q\vec{V} \times \vec{B}$ (e) $\vec{F}_B = qAB \times \vec{V}$
31. How much work is required to carry an electron from the positive terminal of a 12-V battery to the negative terminal?
- (a) $1.9 \times 10^{-18} \text{ J}$ (b) $1.9 \times 10^{-18} \text{ J}$ (c) $1.6 \times 10^{-17} \text{ J}$ (d) $1.2 \times 10^{-18} \text{ J}$ (e) $1.0 \times 10^{-17} \text{ J}$
32. Calculate the conductivity and resistance of a given uniform wire of length 2.0 m and resistivity $5.4 \times 10^{-7} \Omega \cdot \text{m}$ if the cross-sectional area of the wire is $9.5 \times 10^{-3} \text{ cm}^2$.
- (a) $1.85 \times 10^6 \Omega^{-1} \text{ m}^{-1}$, 1.14 Ω (b) $3.70 \times 10^6 \Omega^{-1} \text{ m}^{-1}$, 1.14 Ω (c) $1.85 \times 10^6 \Omega^{-1} \text{ m}^{-1}$, 2.28 Ω (d) $3.70 \times 10^6 \Omega^{-1}$, 2.28 Ω (e) $1.6 \times 10^6 \Omega^{-1} \text{ m}^{-1}$, 3.14 Ω
33. The equation $\vec{F} = q(\vec{E} + \vec{V} \times \vec{B})$ is termed as
- (a) Magnetic force (b) Electric force (c) Lorentz force law (d) Force square law (e) Electromotive Force
34. A coil of 10 turns and cross-sectional area 5 cm^2 is at right angles to a flux density $2 \times 10^{-2} \text{ T}$ which is reduced to zero in 10s. Find the induced e.m.f.
- (a) $1.0 \times 10^{-5} \text{ V}$ (b) $10 \times 10^{-5} \text{ V}$ (c) $100 \times 10^{-5} \text{ V}$ (d) $1.0 \times 10^{-5} \text{ A}$ (e) $13 \times 10^{-5} \text{ V}$
35. Two large, parallel conducting plates are 12 cm apart and have charges of equal magnitude and opposite sign on their facing surfaces. An electrostatic force of $3.9 \times 10^{-15} \text{ N}$ acts on an electron placed anywhere between the two plates (Neglect fringing). The electric field at the position of the electron and the potential difference between the plates respectively are:
- (a) $2.4 \times 10^4 \text{ Vm}^{-1}$ and $2.9 \times 10^3 \text{ V}$ (b) $3.5 \times 10^4 \text{ Vm}^{-1}$ and $2.7 \times 10^3 \text{ V}$ (c) $2.5 \times 10^5 \text{ Vm}^{-1}$ and $2.5 \times 10^2 \text{ V}$ (d) $4.5 \times 10^3 \text{ Vm}^{-1}$ and $5.0 \times 10^3 \text{ V}$ (e) $6.4 \times 10^3 \text{ Vm}^{-1}$ and $5.9 \times 10^3 \text{ V}$
36. An electric field with a magnitude of 100 N/C exists at a spot that is 15cm away from a charge. At a place 45cm from this charge, calculate the electric field strength.
- (a) 53.3 N/C (b) 50 N/C (c) 36 N/C (d) 18 N/C (e) 19 N/C
37. Which of the following circuit element stores charges energies in term of magnetic field
- (a) Condenser (b) Inductance (c) Variable resistor (d) Resistance (e) Reactance.
38. Which of the following statements is not correct about the resistance of a wire?
- (a) The length of the wire increases as the resistance increases (b) The cross-sectional area increases as the resistance increases (c) Temperature increases as the resistance increases (d) The nature of material does not affect the resistance of a wire (e) none
39. If the electric field in the region between the deflecting plates of a cathode ray oscilloscope is $30,600 \text{ N/C}$, calculate the force on an electron in the region.
- (a) $4.8 \times 10^{-18} \text{ N}$ (b) $2.8 \times 10^{-15} \text{ N}$ (c) $4.8 \times 10^{-15} \text{ N}$ (d) $2.8 \times 10^{-15} \text{ N}$ (e) $6.8 \times 10^{-18} \text{ N}$
40. The electric potential difference between the ground and a cloud in a particular thunderstorm is $1.2 \times 10^9 \text{ V}$. The magnitude of the change in potential energy (in multiples of the electron-volt) of an electron that moves between the ground and the cloud is:
- (a) 4.8 GeV (b) 1.2 GeV (c) 2.4 GeV (d) 3.6 GeV (e) 6.2 GeV
41. One of the following type of waves propagates via a material medium
- (a) Sound wave (b) both transverse and longitudinal wave (c) transverse wave only (d) none of the above (e) Atomic wave
42. Three point charges $q_1 = -1 \mu\text{C}$, $q_2 = +3 \mu\text{C}$ and $q_3 = -7 \mu\text{C}$. If the separation between q_1 and q_2 is 20cm and between q_2 and q_3 is 15cm, calculate the net force on q_2 .
- (a) 8.4 N/C (b) 5.7 N/C (c) 2.7 N/C (d) 11.1 N/C (e) 7.4 N/C
43. A transformer connected to a 120V ac power line has 200 turns in its primary winding and 50 turns in its secondary winding. The secondary is connected to a 100 Ω light bulb. How much current is drawn from the 120V power line?
- (a) 0.075A (b) 0.075A (c) 0.0075A (d) 0.065A (e) 0.56A



44. A test charge of $+3\mu\text{C}$ is at a point P where an external electric field is directed to the right and has a magnitude $4 \times 10^6 \text{ N/C}$. If the test charge is replaced with another test charge of $-3\mu\text{C}$, the external electric field at P
(a) is unaffected (b) reverses direction (c) changes in a way that cannot be determined (d) goes up and down increased in magnitude.
45. The core of a coil has a length of 200 mm. The inductance of coil is 6 mH. If the core length is doubled, all other quantities remaining the same. What is the inductance of the coil?
(a) 3 mH (b) 12 mH (c) 24 mH (d) 48 mH (e) a and b
46. Five point charges are enclosed in a cylindrical surface S. If the values of the charges are $q_1 = +3\text{nC}$, $q_2 = -2\text{nC}$, $q_3 = +2\text{nC}$, $q_4 = +4\text{nC}$ and $q_5 = -1\text{nC}$, find the total flux through S.
(a) 200 Vm (b) 678 Vm (c) 260 Vm (d) 700 Vm (e) 760 Vm
47. A circular coil of wire 6.5 cm in diameter has 12 turns and carries a current of 2.7 A. The coil is in a region where the magnetic field is 0.56 T. What is the maximum torque on the coil?
(a) 0.0698 Nm (b) 0.60890 Nm (c) 0.27353 Nm (d) 0.19698 Nm (e) 1.25 Nm
48. The $\int \mathbf{J} \cdot d\mathbf{A}$ represents ----- where J is the current density and A is the area
(a) Resistance (b) Potential difference (c) electric current (d) resistivity (e) Field
49. The electric potential energy of two electrons separated by 2.0 nm is:
(a) $1.15 \times 10^{-19} \text{ J}$ (b) $2.75 \times 10^{-19} \text{ J}$ (c) $17.25 \times 10^{-19} \text{ J}$ (d) $6.95 \times 10^{-19} \text{ J}$ (e) $4.75 \times 10^{-19} \text{ J}$
50. An electron moves round a fixed proton at a distance of $5.29 \times 10^{-11} \text{ m}$. calculate the potential the proton creates at this distance
(a) -13.6 V (b) +6.8 V (c) +27.2 V (d) +13.6 V (e) -6.8 V