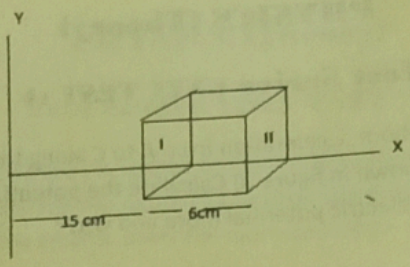
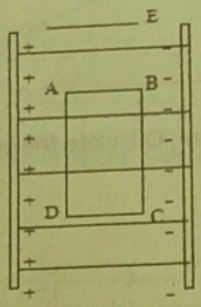


Q5.A uniform electric field exists between two charged plates as shown in the figure. What should be the work done in moving a charge q along the closed rectangular path ABCDA ?



State Gauss' theory.Using this theory find the expresssion of electric field intensity due to an infinitely long straight uniformly charged thin conductor .

Derive the expression of Coulomb's law in vector form.

Q55. An alternating voltage $V = V_m \sin \omega t$ applied to a series LCR circuit drives a current given by $i = i_m \sin (\omega t + \phi)$. Deduce an expression for the average power dissipated over a cycle.

Q56. Write any two sources of energy loss in a transformer.With diagram explain the workin principle of a step up and step down transformer.

**** Numericals from ac is very important for 2018 board examination.(see NCERT)**

Q57. From EM waves see (2008,20013 and 2014 Board's paper)

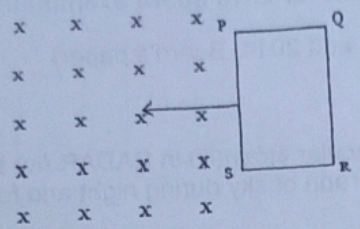
Q58.Name the electromagnetic spectra

(i) For aircraft navigation (ii) to treat muscular strain(iii) in RADAR (iv) to photograph internal parts of a human body (v) taking photograph of sky during night and foggy conditions.and (vi) studying crystal structure.

****

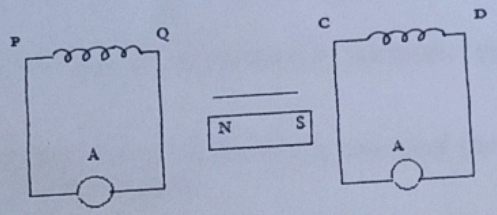
Q43. Define Wattless current ,power factor ,Q-factor, capacitor reactance.(with unit)

Q44. The closed loop PQRS is moving into a uniform magnetic field acting at right angles to the plane of the paper as shown. State the direction of the induced current in the loop.



Q45. A variable frequency ac source is connected to a capacitor. How will the displacement current change with decrease in frequency?

Q46. A bar magnet is moved in the direction indicated by the arrow between two coils PQ and CD. Predict the directions of induced current in each coil.



Q47. A beam of alpha particles projected along(+) X-axis,experiences a force due to a magnetic field along the (+) Y-axis. What is the direction of the magnetic field?

Q48. . For household electrical wiring, one uses Cu wires or Al wires.What considerations are kept in mind? What is Bohr magneton ?

Q49. Graphical questions are very important for 1 mark.

Q50. Mention the two characteristic properties of the material suitable for making core of a transformer.

Q51. In series LCR circuit, obtain the conditions under which (1) the impedence of the circuit is minimum, and (ii) wattles flows in the circuit.

Q52. Write Farday's law of electromagnetic induction.Prove that an ideal capacitor in an ac circuit does not dissipate power.

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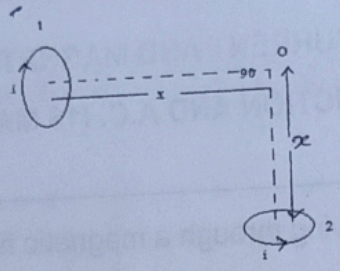
Q53. What is impedance? A series LCR circuit is connected to an ac source having voltage $V=V_0 \sin\omega t$. Derive the impedance , instantaneous current and its pahse relationship to the applied voltage. Find the expression for resonant frequency.

Q54.State the condition for resonance to occur in series LCR a.c. circuit and derive an expression for resonant frequency. Draw the plot showing the variation of the peak current (i_m) with frequency of the a.c. source used.

Q35. Describe the principle, construction and working of moving coil galvanometer. How its sensitivity can be increased ? Why is it necessary to introduce a cylindrical soft iron core inside the coil of a galvanometer ? Increasing the current sensitivity of a galvanometer nay not necessarily increase its voltage sensitivity. Explain.What is the function of an uniform radial magnetic field in MCG?

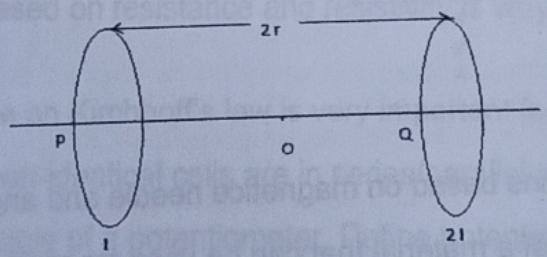
Q36. Two small identical circular loops , marked 1 and 2 , carrying equal currents are, placed with the geometrical axes perpendicular to each other as shown in the figure. Find the magnitude and direction of the net magnetic field produced at the point O .



Q37. A circular coil of 'N' turns and diameter 'd' carries a current 'I' . It is unwound and rewound to make another coil of diameter ' 2d' ,current I remaining the same. Calculate the ratio of the magnetic moments of the new coil and the original coil.

Q38. What is meant by the transverse nature of electromagnetic waves? Draw a diagram showing the propagation of an electromagnetic wave along X-direction, indicating clearly the directions of oscillating electric and magnetic fields associated with it.

Q39. Two identical circular loops, P and Q, each of radius r and carrying currents I and 2I respectively are lying in parallel planes such that they have a common axis. The direction of current in both the loops is clockwise as seen from O which is equidistant from the both loops. Find the magnitude of the net magnetic field at point O.



Q40. Explain the conversion of galvanometer into ammeter and voltmeter with diagram.

Derive an expression for the force per unit length between two long straight parallel current carrying conductors. Hence define S.I. unit of current.

Q41.Derive an expression for the magnetic field at a point on the axis of a current carrying circular loop.

**** Practice numerical based on two co-axial circular loops for finding direction and magnitude of current.**

Q42. Using Ampere's circuital law find an experession for the magnetic field at a point on the axis of a long solenoid with closely wound turns.

LONG TYPES :

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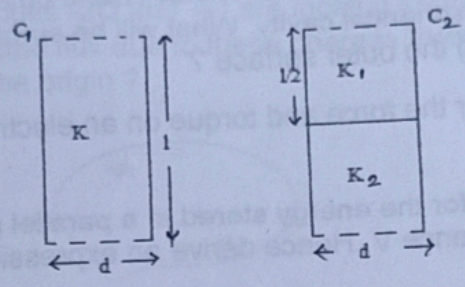
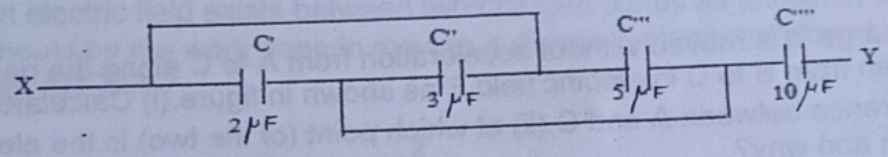
Q31.Briefly explain the principle of a capacitor. Derive an expression for the capacitance of a parallel plate capacitor, whose plates are separated by a dielectric medium. Drive an expression for the capacitance of a parallel plate capacitor when a dielectric slab of dielectric constant K and thickness =d/2 but of same area as that of the plates is inserted between the capacitor plates(d=separation gap).

Q32. Two capacitors with capacitances C_1 and C_2 are charged to potentials V_1 and V_2 respectively and then connected in parallel. Calculate the common potential across the combination, the charge on each capacitor, the electrostatic energy stored in the system and the change in electrostatic energy(energy loss) from its initial value.

Q25.(i) Two identical parallel plate capacitors C_1 ans C_2 have capacitances C each. The space between their plates is now filled with dielectrics as shown. If the capacitors still have equal capacitance, obtain the relation between dielectric constants K,K_1 and K_2.

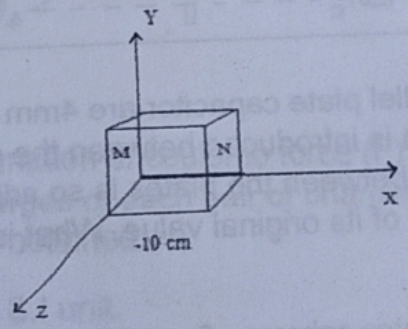


Q26. Four capacitors are connected as shown in figure:



Calculate the equivalent capacitance between the points X and Y.

Q27. Electric field in the given figure is directed along +X direction and given by E_x= 5Ax +2B, where E is in NC^{-1} and x is in meter , A and B are constant with dimensions.Taking A = 10N/C/m and B = 5N/C calculate (i) the electric flux through the cube (ii) net charge enclose within the cube.



Q28. Four point charges q_A=2μC, q_B=-5μC ,q_C=2μC and q_D=-5μC are located at the corners of a square ABCD of side 10 cm. What is the force on a charge of 1μC placed at the centre of the sphere ?

Q29. Two charges q and -3q are placed fixed on x-axis separated by distance 'd'. Whare should a third charge 2q be placed such that it will not experience any force

Q30.Two charges 2μC and -2μC are placed at points A and B 6cm apart. (i) Identif an equipotential surface of the system.(ii) What is the direction of the electric field a every point on this surface?

(ii) Wrtite the expression for the electric field at a point $x>r_2$ from the centre of the shell.

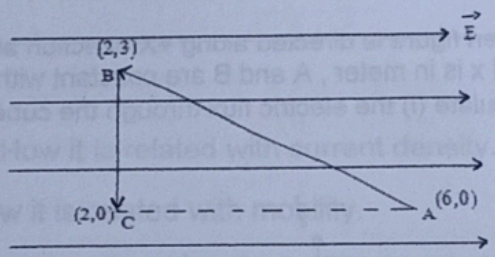
Q18.A metallic spherical shell has an inner radius $R_1$and outer R_2. A charge Q is placed at the centre of the spherical cavity. What will be surface charge density on (i)the inner surface , and (ii) the outer surface ?

Q19.Find the expression for the force and torque on an electric dipole kept in a electric field.

Q20. Derive an expression for the energy stored in a parallel plate capacitor C, charged to a potential difference V. Hence derive an expression for the energy density of a capacitor.

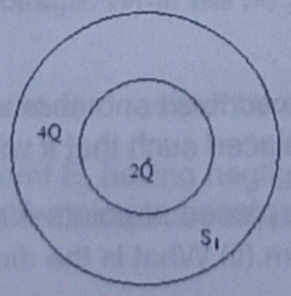
Q21. Two concentric metallic spherical shells of radii R and 2R are given charges $Q_1$and Q_2 respectively. The surface charge densities on the outer surfaces of the shells are equal. Determine the ratio $Q_1:Q_2$.

Q22.A test charge 'q'is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in figure.(i) Calculate the potential difference between A and C.(ii) at which point (of the two) is the electric potential more and why?



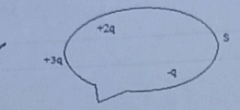
Q23. The two plates of a parallel plate capacitor are 4mm apart. A slab of dielectric constant 3 and thickness 3mm is introduced between the plates with its faces parallel to them. The distance between the plates is so adjusted that the capacitance of the capacitor becomes 2/3rd of its original value. What is the new distance between the plates ?

Q24. Consider two hollow concentric spheres , S_1 and S_2 , enclosing charges 2Q and 4Q respectively as shown in the figure.(a) how will the electric flux through the sphere S_1 change if a medium of dielectric constant 'ε_r' is introduced in the space inside S_1 in space of air? Deduce the expression.



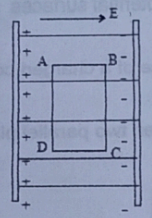
Q10. The dimensions of an atom are of the order of an Angstrom. Thus there must be large electric fields between the protons and electrons. Why then is electrostatic field inside a conductor zero ?

Q11. Two charges of magnitudes -2Q and +Q are located at points(a,0) and (4a,0) respectively. What is the electric flux due to these charges through a sphere of radius '3a' with its centre at the origin ?



Q12.Sketch the elctric field lines for two point charges q_1 and q_2 for $q_1 = q_2$ and $q_1 > q_2$ separated by a distance d.

Q13. A uniform electric field exists between two charged plates as shown in the figure. What should be the work done in moving a charge q along the closed rectangular path ABCDA ?



Q14. Plot a graph showing the variation of coulomb force (F) versus$(1/r^2)$, where r is the distance between the two charges of each pair of charges : (1μC , 2μC) and (2μC ,-3μC). Interpret the graphs obtained.

Q15.Define electric flux. Write its S.I unit.

SHORT TYPES:

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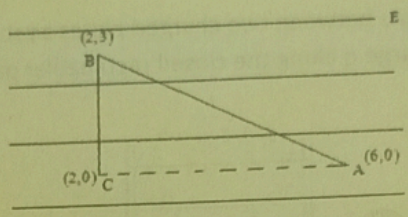
Q16. An electric dipole is held in a uniform electric field.(i) Show that the net force acting on it is zero.(ii) The dipole is aligned parallel to the field. Find the work done in rotating it through the angle of 180^0.

Q17.A spherical conducting shell of inner r_1 and radius r_2 has a charge'Q'. A charge 'q' is placed at the centre of the shell. (i) What is the surface charge density on the (a) inner surface (ii) outer surface of the shell?

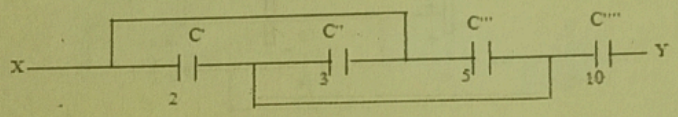
Class xii **PHYSICS (Theory)** Assignment1

F.M :25 **Test Series UNIT TEST :1** TIME:1.30HRS.

Q1. A test charge 'q' is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in figure.(i) Calculate the potential difference between A and C.(ii) at which point (of the two) is the electric potential more and why?



Four capacitors are connected as shown in figure: Calculate the equivalent capacitance between the points X and Y.



Q2. Define dielectric constant. Derive the expression of capacitance when a dielectric slab is placed between two parallel plate capacitors. . Why do the equipotential surfaces due to a uniform electric field not intersect each other?

Q3. Keeping the voltage of the charging source constant, what would be the percentage change in the energy stored in a parallel plate capacitor if the separation between its plates were to be decreased by 10% ?

Two capacitors with capacitances C1 and C2 are charged to potentials V1and V2 respectively and then connected in parallel. Calculate the common potential across the combination, the charge on each capacitor , the electrostatic energy stored in the system and the change in electrostatic energy from its initial value.

Q4. The two plates of a parallel plate capacitor are 4mm apart. A slab of dielectric constant 3 and thickness 3mm is introduced between the plates with its faces parallel to them. The distance between the plates is so adjusted that the capacitance of the capacitor becomes $2/3^{rd}$ of its original value. What is the new distance between the plates ?

Electric field in the given figure is directed along +X direction and given by $E_x = 5Ax + 3B$, where E is in NC^{-1} and x is in meter , A and B are constant with dimensions.Taking A = 10N/C/m and B = 5N/C calculate (i) the electric flux through the cube (ii) net charge enclose within the cube.

CHAPTER : MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

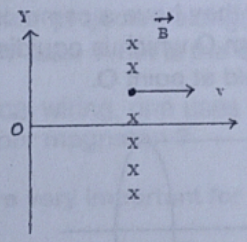
ELECTROMAGNETIC INDUCTION AND A.C. (16 MARKS)

Assignment 4 Class xii

Q26.Under what condition an electron moving through a magnetic field experiences the maximum force?

Q27.Write the expression, in a vector form, for the Lorentz magnetic force F due to a charge moving with velocity v in a magnetic field B. What is the direction of the magnetic force?

Q28. A long straight wire carries a steady current I along the positive Y-axis in a coordinate system. A particle of charge +Q is moving with a velocity v along the X-direction. In which direction will the particle experience a force ?



Q29. Practice conceptual questions based on magnetice needle and angle of deep.

Q30.Mention two characteristics of a material that can be used for making permanent magnets.

Q31. State the underlying principle of a cyclotron. Write briefly how this machine is used to accelerate charged particles to high energies.

Q32. Compare between diamagnetic ,paramagnetic and ferromagnetic materials .

Q33.What is Curie law in magnetism?

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Q34. Explain the principle and working of a cyclotron with the help of a neat diagram. Derive an expression for time period and cyclotron frequency.

CHAPTER : ELECTROSTATICS (8 MARKS)

OBJECTIVE TYPES:

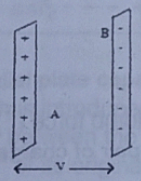
Q1. Two charges of magnitudes -2Q and +Q are located at points(a,0) and (4a,0) respectively. What is the electric flux due to these charges through a sphere of radius '3a' with its centre at the origin?

Q2.A charge Q μC is placed at the centre of a cube. What would be the flux through one face ?

Q3. What is the geometrical shape of equipotential surfaces due to signle isolated charge?

Q4.Why must electrostatic field at the surface of a charged conductor be normal to the surface at every point ? Give reason.

Q5.Two protons,A and B , are placed between two parallel plates having a potential difference V as shown in the figure.



Will the protons experience equal Or unequal force ?

Q6. Why do the equipotential surfaces due to a uniform electric field not intersect each other ?

Q7. Draw an equpotential surface for a system consisting of two charges Q, -Q separated by a distance r in air. Locate the points where the potential due to the diole is zero.

Q8. Define dielectric constant of a medium. What is the value of dielectric constant for a metal ?

Q9. Sketch graph to show how charge Q given to a capacitor of capacitance C varies with the potential difference .