welcome to iit-jee advanced physics problem solving session today we are going to solve some problems on electrostatics from pvr csg advanced question papers
 so let us work out this problem first in this problem that was asked in 2011 they advanced a wooden block performs simple harmonic motion on a frictionless surface with frequency nu0 the block contains a charge plus q on its surface if now a uniform electric field is switched on as shown then simple harmonic motion of the block will be four options are given uh option a of the same frequency and with shifted mean position option b of the same position and with same mean position option c of sense frequency and with shifted mean position of sense frequency with same mean position
 so basically you are you have to find out the mean position as well as the frequency after the electric field is getting switched on
 so let us solve this problem and to solve this problem let me assume that the block has mass say m and the spring constant is of the spring is say k then you know if the electric field is not switched on um okay say before before before electric field e is switched on that means in the absence of the electric field the ssm hsm frequency simple harmonic motion frequency you know it's very it's given by 1 by 2 pi root over k by m okay now say electric now say now let me consider the case when e is switched on now e is switched on now in this case uh what is going to happen because of the electric field this block which was say earlier in the mean position say oh it would be it would be shifted to this position say odes and this this it is shifted by distance x0 and you have this spring is k the spring will be compressed by an amount x0 but at the mean position in this new mean position odes the block will be in equilibrium block is in is in equilibrium equilibrium at o odes due to the electric force electrostatic force and the spring force
 so electrostatic force is qe and the spring force would be qx0 and therefore you see the mean position is x0 would be simply qe by k now let us say now let us say this block is shifted by an amount x from its mean position o dash then the equation of motion would be d2x dt2 and the force would be one is due to the spring that will be a k into x because it is shifted from the mean position by amount x
 so therefore this would be this would be the spring force and there is an external electrostatic force it would be qe and you already know that qe is equal to kx naught
 so therefore you see you have kx minus k x 0 plus this one is k x 0
 so you are having simply k x minus k x that means i can write this equation as d 2 x d t 2 plus k by m x is equal to 0 and this one is your familiar your omega square
 so because omega square is k by m or i can just write omega is equal to square root of k by m and therefore your nu is equal to 1 by 2 pi root over k by m
 so this is the same frequency as that this one before the electric field is switched on
 so i can easily see that option a is the correct one
 so simple harmonic motion the frequency is not getting changed ssm frequency remaining same only thing is that it mean position is getting shifted
 so only one option is correct in this problem and that is option a now come to this problem this was asked in 2008 j advanced consider a system of three charges q by 3 q by 3 and minus 2 q by 3 at points a points b and point c as shown in the figure take o as the center of the circle of radius r and angle c a b is equal to 60 degree
 so you have to the four options are given the electric field at point o is this mass directed along the negative x-axis and the potential energy of the system is zero

so these four options are there

so let us work it out

so to do it little bit more in a cleaner way

so let us say let me denote the charge at position a is you have q by 3 charge at b is again q by 3 and charge at c stars at c is minus 2 q by 3 okay

so you see the electric field now you can easily see the this is same positive charges at a and b electric field at a and electric field at b they would be in the opposite direction right they are same magnitude but opposite in direction

so therefore the resulting in a resultant electric field will be uh because of this two charges result in electric field at point o due to the charges at a and b would be zero there

so therefore the only the electric field at o would be due to the charge at c

so you can immediately write the electric field at point o would be simply due to the charge at c which is charge is minus 2 q by 3 and the distance is 4 pi distance is simply r radius of this r is the circle of the radius

so it is r square and this would be along this direction x cap

so therefore if you simplify it the answer would be minus q six pi epsilon zero r square x cap now if you see the option in the option it is directed along negative x axis but the magnitude is this much but we are getting it to be this

so therefore option a cannot be the correct one now coming to the potential energy of the system potential energy of the it's not potential it's energy potential energy of the system let me denote it by u it would be 1 by 4 pi epsilon zero and i have this combination i have to consider charge combination q a q b r a b let me denote the distance between a and b as r a b and similarly i can write it for qa qc divided by rac plus qb qc divided by r c okay

so this is what i have now i know q a q b q c but i don't know our i i can i have to find out what is r a b for example r a b r a c r b c i have to find out r a b the distance this is the radius radius radius

so it is simply twice r r a b is equal to r and r ac this angle is given 60 degree or you know that this angle is also going to be 30 degree because this guy is 90 degree

so therefore i can from the diagram i can simply write that rac rac is equal to r a b sine 30 degree or cos 60 degree

so this is what i have r ac okay

so this would be half r a b or actually you can write cos 60 degree also then that is also half

so therefore our ac is simply r and your rbc you can apply the pythagoras theorem rbc a b square here r a b square is equal to rbc square plus r a c square

so r b c square is equal to r a b square minus r a c square and i know that r a b is equal to 2r rac is equal to r

so rbc you can immediately find out that to turn out to be root tree into r

so the potential energy would turn out to be 1 by 4 pi epsilon 0 if you put down the value of qa qb this is what you should get q square first term will give you this one q square by 18 r second term will give you 2 k square 9r minus then you have 2 q square 9 root 3 r okay and this is obviously not going to be equal to zero

so therefore option potential system is zero that's not correct now come to the option c the magnitude of the force between charge hc and b okay

so basically you have to find out what is your uh force right force b2 between these two points that would be magnitude wise it would be simply 1 by 4 pi epsilon 0 qb qc divided by the distance which already we have worked it out if you put down all these values then you are you should be get q square divided by 54 pi epsilon 0 r square all right

so let us see yes this force is q square

so this one is correct option c is correct what about option d potential at point o now if you see the potential at point o now it is easy to see that this point is equidistant from all this point a b and c and the total charges if you calculate it that would turn out to be zero

so therefore potential at point o would be simply zero its potential not potential energy

so potential at point o would be one by four pi epsilon zero that is uh qa because they are all of them are equals at distance r it would be q a by r q b again it would be r by r plus q c by r now you know what is q a and q b equal to are equal but q c is minus of uh this charges twice of that

so therefore if you put down the value it would turn out to be zero

so therefore option d also is ruled out

so so therefore uh correct correct option would be simply one option is correct correct option is c okay

so correct option is only c okay let us do another problem six point surges are this was asked in 2012 je advanced

so if you read the problem the six point sources are kept at the vertices of a regular hexagon of side l and center o as shown in the figure given that k is equal to this much uh who is of the following statement is uh is or are are correct move

so more than one option may be correct

so let us find it out uh option by option

so let us solve it

so the elect first of all the electric field at o

so the electric field at the point o would be you have to calculate it due to the all this pair of charges

so if i write the electric field electric field at o first of all let me say due to charges due to charges at say a and d okay what about the force due to a a and d and you see this is a at a charges here positive source

so the force would be force at let me write it like this force at o due to a okay that would be uh 2q i'm writing the magnitude first 2q divided by 4 pi epsilon 0 the distance is l right

so it is 4 2 q 4 pi epsilon not l square now if i go by the symbol here it is q by 4 pi epsilon 0 l square is denoted by the symbol k

so in that short notation i can write it as 2k

so this force is along at the point o it would be along od due to charge 2q similarly uh if you look at the charge at minus 2q uh at d sorry that is minus 2 that is also along the same direction

so the force sorry i should i say force i should say electric wheel i'm sorry

so electric field at uh at electric field at o due to charge at a and d would be along the direction of od and that would be 4k because one it is because they are going to add up

so that would be 4k along od okay and then you have the second one due to charges at uh you have b and e b and e is in the similar logic if i apply along b and e it would be along o e and this would amount to it would be half of this

so it would be simply 2k 2k it would be 2k along o e okay and then due to charges at i have another pre slip at cnf is again because the plus q minus q

so it would be again along 2k but it would be it would be amount of the magnitude the force would be 2k and it would be along o c

so if i just uh i can just pictorially speaking

so along one force is along od that is amount 4k another one is along o e that is 2k and another this one is along oc and that's also 2k and you see that this angle is basically 45 degree

so the resultant resultant force at o would be it is simply 2k oh i'm sorry this should be it's a hexagon
 so yeah these are equal
 so this is obviously 60 degree okay
 so i'm sorry this has to be 60 degree 60 degree okay and therefore it would be 2k cos 60 degree along ot right this would be all of them would be along this direction but the one this perpendicular component would get cancelled out
 so therefore resultant force would be along od 2k cos 60 degree and this is also 60 degree
 so you have another term because of that that would be 2k cos 60 degree and another would be 4k and you see that this would be 6k along o d is that option is there yes it is there
 so option a is correct now what about the potential at o yeah potential at o is zero obviously but let me show it exclusively potential little bit more in detail if i work it out potential at this at point o would be sum of you know you just have to find out 1 by 4 pi epsilon 0 all the charges you just this is the formula and all of them are equally distant
 so i can take this term out
 so i will have 1 by 4 pi epsilon 0 l sum of all the charges and if you you can easily see that if you sum up all the charges that is going to give you 0
 so therefore this would be simply 0 is that option is there yes that option is also correct now the option c the potential at all points on the line pr is same now if you look at the line pr for if you look at this line pr at any point for any point on pr we have pairs of you know their equivalent opposite charges are on the both sides
 so are lying along this
 so in fact this line is acting like a perpendicular bisector of the dipoles this is this is one dipole this is another dipole this is another dipole
 so it acting like a perpendicular bisector and you know that the potential um at this bisector is going to be zero
 so therefore what i could say that potential at all points uh on the line pr is same
 so that's correct
 so this option is correct now what about the line this one port option st now st is you see this along the axial line of the dipoles
 so therefore obviously the potential at each point cannot be same
 so this option is ruled out
 so you are left out with correct option a b and c are the correct options
 so they are the correct options in this particular problem okay let us do this problem now it was asked in 2009 z advanced under the influence of the coulomb field of charge plus q a charge minus q small minus small q is moving around it in an elliptical orbit find out the correct statements
 so statement a option angular momentum of the charge minus q is constant the linear momentum of charge minus q is constant the angular velocity of charge minus q is constant and port option b is linear speed of charge minus q is constant okay let us do this problem
 so if you uh see that the small charge minus q is moving in an elliptical orbit because and this charge plus q is sitting in one of the foci of the ellipse
 so plus q and this charge is a minus q it's moving here moving around in the elliptical orbit
 so to find out angular momentum you know angular momentum is related to torque rate of change of angular momentum is torque
 so therefore let us first find out what is the torque on charge minus q okay
 so torque on charge minus q due to the coulomb force due to coulomb force that

would be if the distance between the charges this is say r okay radial distance r

so that would be force would be capital q q and then minus sign is there and 4 pi epsilon 0 and the distance is r square let me say this is along our cap here it is r cap direction now torque is torque is r cross f okay now in this case it's easy to see that both r and f are along the same direction in the radial direction

so therefore it is simply zero okay because both of them are this cross product

so and now torque is equal to rate of change of angular momentum which is equal to 0

so it implies that angular momentum l is constant it's a constant

so the first option is correct the angular momentum of the charge minus q is constant now what about the linear momentum or is it constant you can see that this force is rate of sense of linear momentum right and but this is not non-zero force is not zero

so therefore p is not constant p is not constant

so option c b is not correct this is not constant what about the angular velocity now you see angular momentum is constant

so that means angular momentum you know that that will be m omega r square now because this guy l is constant

so to make it constant omega should also vary because r is very

so as l is constant because r is anyway varying right because r is different at different different position here is it moving

so omega has to vary l is constant uh omega must vary because you have to keep l constant because rd is spinning omega or angular velocity omega must vary

so angular velocity cannot be constant right the angular velocity of charge q is constant which is not correct it cannot be constant then finally the linear speed of the charge minus q is constant is it is it

so you see speed is v is equal to omega into r now quite clearly because omega is changing r is changing

so therefore linear velocity is also changing

so it cannot be linear velocity is also not constant

so linear velocity is not constant

so what we can then say is that option d is also not correct only one option is correct and that is option a okay now let us do this problem four this was actually 2011 z advanced four point charges ease of plus q are recently fixed at four corners of a square planar soap flame film of site a the surface tension of the soap film is gamma the system of charges and planar film are in equilibrium and a is equal to this where okay where k is constant and n

so this is an integer type equation you have to basically find out n to find out n you have to work out what the expression for a all right

so let us do it let us do it

so you are given a rigid kind of a square is there and this let me name it this charge q is four charges are point surges all of them are equal charge is put there let me name it as this side point says abcd all right

so how to do this problem first of all i if you look at it the size given the in the problem the surface tension of the soap frame is given to be gamma

so if i look at the site says c bc the i can see that force due to the surface tension force on line bc due to surface tension is because this is a this this is a this is a and therefore it's simply gamma a and it would be alongside this direction now in equilibrium if it has to be equilibrium this has to be balanced and there has to be an equal and opposite force to this that would be along this direction and that has to be obviously due to the this electrostatic force

so let us find out the electrostatic force on this line bc then but to do that

let us do the analysis little bit more carefully if you look at the say point a here now at the point if you calculate the force at point a due to the charge at b d and c okay first say due to the charge at b

so this would be along this direction right along this direction and due to the charge at d it would be along at d it would be along this direction and again if you look at this one because of the charge at c it would be along this direction and quite clearly if you look at the resultant okay first of all what about the magnitude

so let me let me say this one is f1 this is okay let me see it's the same color this is f2 and this is say f3 now f1 is obviously equal to due to b it would be q square divided by 4 pi epsilon 0 a square and who is for simplicity i can write it as some constant k q square by a square q square by a square and right k is equal to capital k is equal to 1 by 4 pi epsilon 0 and what about f2 f2 is also magnitude wise this is also going to be the same but f3 i'm not talking about i'm writing the magnitude only f3 it is very simple problem you see this distance is simply this is a this is a

so this would be root 2a from pythagoras theorem

so therefore it would be q square divided by 4 pi epsilon 0 2 a square

so this is k q square by 2 a square

so that is my f 3

so resultant force now you see this is this has to be 45 degree right

so this is your 45 degree this is 45 degree

so resultant force let me write resultant force resultant force at a at the point a would be say f is equal to k q squared a square this is 45 degrees

so it is because 45 degree similar would be for f2 also

so twice and f3 is along

so resultant force would be actually along this direction right

so along this direction

so that would be k q square by 2 a square

so i can write down the expression now as k q square capital k q k square is square and cos 45 degree 1 by root 2

so this is 2

so it is root 2 and then i have here a half here

so that would be my force now actually because all these are this is sim from symmetry the same force would be at this side at point b point c point d would also be there

so you are going to have this is the kind of situation you are going to have the this force here is along this direction at this point a b c d here also it would be along this direction this 45 degree this is f similarly here okay 45 degree and it's also here 45 degree now as i said in earlier that the surface tension force is gamma a and that has to be to be in equilibrium it has to balance by the electrostatic force now if you see the electrostatic force on this line bc due to would be total would be f cos 45 degree and from this point and in this point

so it is twice f cos 45 degree

so if you already i have worked it out

so you can write here that gamma a is equal to twice f

so if i just write this expression here cos 45 degree is equal to 1 by root 2

so this is root 2 into f f is k q square a square square to a half

so i have to find the expression for a

so if i take it this side this would be a cube and you will have root 2 capital q you have root 2 plus half then you have q square by gamma okay

so this is a constant term

so that is as given in the problem this small k q square by gamma

so therefore your a is equal to uh actually in the problem let me say this k 0 and then then k0 to the power 1 by 3

so that is a constant k q square by gamma 1 by 3

so if you look at the problem here

so q square by gamma this is some constant

so 1 by 3 we are getting

so n is equal to 3

so it's a simple problem

so your n is i'm doing it in details but some of you can do it within minutes now n is equal to three okay

so let us do another one this is four charges this is a matching type question four charges q q1 q2 q3 and q4 of the same magnitude are fixed along x axis at x is equal to okay

so this is your x axis this is your y-axis right though this is the points this charge q is situated at a distance b and there you know this is diagram is what self-explanatory are asked to find out is basically to find out the direction of the forces

so direction of the forces is given in column 2 and directs magnitude of the char actually not magnitude because you see they are same magnitude sign of the charges is given in column one

so depending on the sign of the um charges you are going to get force along different directions

so which direction will corresponding to this column 1 and column 2 you have to match it

so that is what the problem is

so these are the option

so let us do it it's a simple problem from electrostatics but you have to be in this kind of problem it's you always have to be pretty mindful in doing it very carefully you can do it

so first of all magnitudes are equal

so q1 q2 q3 all of them are equal in magnitude let me say that is equal to q okay actually not because q is already used there

so let me write q dash

so this is q

so let me go uh point by point here in the first case all of them are a point at point p in column one where p says q one q two give all positive if all positive then you see uh this is at one

so q one q two

so this is q 1 dash sorry q that's already magnitude is same and now this time they are same charge

so it doesn't matter positive negative all of them are say okay they are all positive it matters

so cue this okay

so at one two three four and here we have the charge q

so let us find out the force due to these charges at this point q here

so from this from the position one you see this would be simply along this direction and from the four this one this would be again along this direction

so resultant would be

so resultant would be something like this because of the charges at one and position one and four now due to the position at two and three this would be along again this direction and this would be along this direction

so this would be again along this direction

so this was y cap y and this is x

so resultant force resultant force is along y kept direction plus y k direction

okay it's a long in in situation first situation then the next one is uh q1 q2 positive 3 4 negative q 1 q 2 positive q 3 q 4 negative
 so q 1 q 2 q 1 q 2 positive q 3 q 4
 so this is what you have here
 so now uh okay
 so this is positive one two three four and this is your charge q now if you look at it because of this again the force would be along this direction and because of this the force would be along this direction
 so resultant will be along this direction okay along this is your x direction but then what about due to position 2 this would be this would be along say this direction and because of this one three it would be along this direction okay here also no issue it would be along this direction
 so resultant force in this case resultant force is along plus x cap direction fine then come to this one case r q 1 q 4 positive q 2 q 3 negative
 so q 1 q4 positive q1 q4 positive and q2 q3 negative
 so in this case again the same analysis if i go by it then this would be the force would be along this direction because of this and because of the one two three four because of the charge at position four okay let me enjoy it a little bit
 so this would be along this direction
 so resultant would be along this direction this would be the resultant due to charges at one and four and due to two and three due to two and three this would be
 so this would be along due to two and three this would be along this direction and due to 3 it would be again along this direction
 so due to 2 and 3 the force would be in the downward direction but does they cancel out it's not because the magnitude of the forces will be different
 so let me just note that down force magnitude force magnitude if we look at uh you see due to at one and four because they are at the same distance distance wise because from this point o
 so force at f1 magnitude wise and four set and due to four at here at the point q say this would be magnitude wise it would be q q dash divided by 4 pi epsilon 0 this distance due to 1 right this distance would be how much this is this distance is your twice a and this distance is b
 so by applying pythagoras i have b square plus 4 a square okay
 so this is what i'll have and again f 2 is equal to f 3 it would be q q dash divided by 4 pi epsilon 0 this distance is a and
 so therefore it would be simply a square plus b square
 so it's very clear that the force uh at 2 3 would be greater than force at 1 4
 so therefore now you see this downward force would be that which is due to 2 and 3 would be greater
 so therefore in this case the the resultant force resultant force will be in negative y direction in fact i can leave it for you to do that in this case in the last case where your q 1 q 3 positive q 2 q 4 negative in this case if you work it out the resultant would turn out to be the resultant force will be along will be along negative x direction if you work it out
 so if you now look at the option here if you note it down you will find that option a is the correct one
 so when q one q two q three key for all positive it matches the uh the force direction is along plus y kept y direction when q one q two positive q three four negative then it is along plus x direction and q one q four in in case r it is along minus y direction in the other case it would be along x direction
 so therefore option a is the correct one in this particular problem it was easy problem now come to this problem uh a particle of mass 10 to the power minus 3

kilogram and charge 1 coulomb is initially at rest at time t is equal to 0 the particle comes under the influence of electric field time varying electric field along this is along x direction i cap okay

so electric field amplitude and angular frequency is given consider the effect of only the electric force on the particle then the maximum speed in meter per second attained by the particle at subsequent time is okay let us do this problem it was asked in 2018 z advance

so the force on the particle due to the electric field is simply q into e now we have to find out the speed or the velocity basically

so therefore you know you from here you know the acceleration that is f by m okay and it is q e by m it's a simple problem because you know the acceleration is given by dv dt and electric field is given as q e0 e0 sine omega t and it is along direction is i cap it is along x direction

so you have to integrate it to find out the velocity suppose initially it velocity is said to be at risk

so v is equal to 0 to some velocity v dv and integration you have to do

so from time t is equal to 0 to some time t

so q e 0 by m sine omega t and this is along i cap

so dt okay actually this is okay fine then i can take it out q e 0 by m 0 to t sine i cap let me take here sine omega t dt and if i integrate this one this is simply going to give me v minus 0 v minus actually if i say it is v 0 okay for your understanding let me write it like this then v minus v 0 that is equal to qe 0 by m i cap and if you integrate it you know this would be minus cos omega t by omega and the integration limit will build from 0 to t and because v 0 is equal to 0 initial speed is 0 velocity

so i have q e 0 by m minus sign let me take out here then i cap and if i put the limits there i will get cos omega t minus oh omega also let me take out it would be minus 1

so v i would get it as q e 0 by m omega that is along x direction and let me write it as 1 minus cos omega t who is further i can write it in one single term that will be i cap twice q e zero by m omega it would be sine square omega t by two all right

so now what about the maximum speed maximum speed is obviously going to be you will get maximum speed when this guy would become maximum and the maximum of sine square omega t by 2 is simply equal to 1

so therefore the maximum speed would be twice q e 0 by m omega now all the values are given and very friendly values are given to you if you put down all the values all the values are in same unit si unit

so you will it would turn out to be 2 meter per second

so the answer would be simply 2 meter per second okay let us do this problem uh this is a problem based on gauss law

so let us do it first of all um let me read out first charges q 2 q and 4 q are uniformly distributed in 3 dielectric solid sphere 1 2 and 3 these are the solid sphere of radius r by 2 r and 2r respectively if magnitude of the electric field at point p at a distance r from the center of the sphere 1 2 3 or e 1 e 2 e 3 respectively then these are the correct option ok let us do it you have to find out the electric field for example in the first sphere you see that you are asked to find out the electric field at the point uh p here which is at a distance r

so you have to draw a gaussian sphere okay gaussian sphere of radius r here and then charge is inside there

so no problem

so you have here electric field say e1 sphere 1 you have sphere 1 e1 into 4 pi r square charge and close this q here and divided by epsilon 0

so therefore electric field is simply q divided by 4 pi epsilon 0 r square okay
so this is what you have for the first sphere now what about the second sphere second sphere is again similar only here the radius is charge is 2q
so second sphere for sphere 2 you will get e2 again you draw it because the sphere itself you can take it as the gaussian sphere
so e2 4 pi r square is equal to charge is 2 q by epsilon 0
so therefore e 2 is equal to twice q divided by 4 pi epsilon 0 r square immediately you see that this is twice of e1 okay
so e2 is greater than e1 that is immediately i think ah but then if you look at d and c and d a and b cannot be uh
so so therefore you have to find out the last one also sp sphere 3 now in this case this sphere has the solid sphere has radius now 2r 2r but the charge is and this charge 4q 4q is distributed uniformly but you are asked to find out the electric field at a point p which is inside the inside the sphere solid sphere and it is at a distance r
so you take it as your gaussian gaussian sphere this is your gaussian sphere
so that would be electric field into 4 pi r square and you have to find out the charge enclosed here now charged and closed you see uniformly distributed
so charge per unit volume that would be you know in the whole solid sphere it will be 4 q divided by 4 by 3 pi r cube here r is radius is 2r okay
so 2r cube
so that's the charge per unit volume
so uh in the gaussian sphere has volume
so therefore q enclosed it's easy one q enclosed would be this is a charge per unit volume and a gaussian sphere volume that is four by three pi r cube
so if you work it out then you will see that this would turn out to be simply q by 2
so this is this implies that your e3 is equal to q divided by in fact 4 pi epsilon 0 r square and then this is your half
so this is half of e 1 okay
so therefore who is option is correct one
so you can see that in this problem your your options c is the correct one because e3 is less than e1 and e2 is greater than e1
so option 3 is the correct option here okay finally let me do this problem consider an electric uh field uh e0 it is along x direction okay e0 is a constant the flux through the say that region as shown in the figure due to this field is what that's what you have to find out this was asked in 2011 you you know the flux is given by you know this formula e dot d s now here the electric field is a constant
so therefore you can take the electric field out
so you will get electric field and in fact the okay this is what you are going to get and this is going to give you electric field into s factor dot product of the surface area vector you have to calculate now this surface area vector s is will be given by this you know cross product of these lines cross product of the sides
so that would be this side this side is a it is along y direction only a is a cap and you take the cross product with this one and that is your a it is along x and z only
so you have a i plus a k cap and if you do it the first one z cross i is going to give you minus k and
so a square this would give you minus k and z and z cross k is going to give you simply i cap
so this is what you'll have okay that means i if i write it i can write it like this i kept k k

so flux would be uh e dot s e is e0 i cap dot a square i cap minus k cap okay it's very simple you will have simply e zero a square all right

so therefore the option which option is correct option c is the correct correct one okay

so that's for today i hope you have benefited by solving these problems on electrostatics