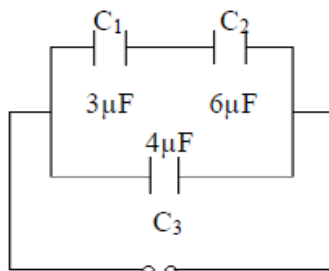


INDIA INTERNATIONAL SCHOOL MANGAF

HOLIDAY HOMEWORK CLASS-XII PHYSICS

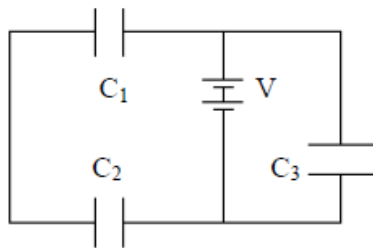
1. The area of each plate of a parallel plate capacitor is 2cm^2 and the distance between the plates is 0.02cm . A potential difference of 6V is applied across the plates. Find the charge on the plates and the electric field established between the plates.
2. A $5\mu\text{F}$ parallel plate capacitor with a dielectric slab of dielectric constant 3 between the plates is charged to 100V and then isolated. What will be the potential difference if the dielectric is removed? How much work would be done to remove the dielectric?

3. Three capacitors are connected as shown in figure.
If a 12V potential difference is applied to the Terminals, what will be
(a) The total capacitance
(b) Charge on each capacitor.

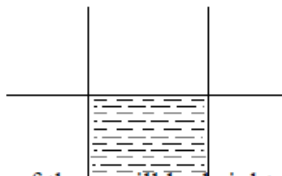


4. A capacitor of capacitance $C_1 = 1\mu\text{F}$ withstands the maximum voltage $V_1 = 6\text{kV}$ while a capacitor of capacitance $C_2 = 2\mu\text{F}$ the maximum voltage $V_2 = 4\text{kV}$. What voltage will the system of these two capacitors withstand if they are connected in series?
5. A parallel plate capacitor is maintained at a certain potential difference. When a 3mm thick slab is introduced between the plates, in order to maintain the same potential difference, the distance between the plates is increased by 2.4mm . Find the dielectric constant of the slab.
6. An $80\mu\text{F}$ capacitor is charged by a 50V battery. The capacitor is then disconnected from the battery and then connected across another uncharged $320\mu\text{F}$ capacitor. Calculate the charge on the second capacitor.

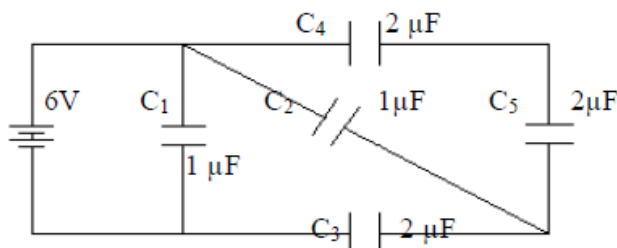
7. Three identical capacitors C_1 , C_2 and C_3 of Capacitance $6\mu\text{F}$ each are connected to 12V battery as shown. Find
(a) Charge on each capacitor
(b) Equivalent capacitance of network
(c) Energy stored in the network of capacitors.



8. Two conducting spheres of radii 4cm and 7cm have charge of 500C and 600C respectively. Calculate the loss or gain in energy when they are connected together.
9. A capacitor half filled with a dielectric of Dielectric constant 4 has a capacitance of $10\mu\text{F}$. What will be its capacitance Without the dielectric?
10. Two electric bulbs of 50W and 100W are given. Which one of them will be brighter when they are connected to the mains (a) in series (b) in parallel?

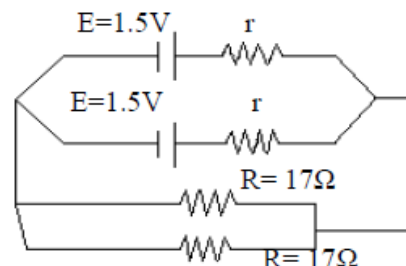


11. Find the total energy in the capacitors given in the circuit.

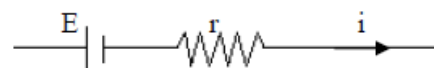
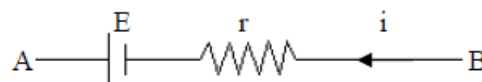


12. The potential difference across the terminals of a storage battery is 10V in a closed circuit. If the external resistance is increased by 1Ω , the potential difference increases by 1V. A further increase in the external resistance of 3Ω produces a further increase of 2V in the potential difference. What is the emf E and internal resistance r of the battery?
13. In a discharge tube the number of hydrogen ions (i.e. protons) drifting across a cross-section per second is 1×10^{18} , while the number of electrons drifting in the opposite direction across another cross-section is 2.7×10^{18} per second if the supply voltage is 230V, what is the effective resistance of the tube?
14. The external diameter of a 5m long hollow tube is 0.10m and thickness of its wall is 5×10^{-3} m. Determine its resistance. Given $\rho_{Cu} = 1.7 \times 10^{-8} \Omega m$

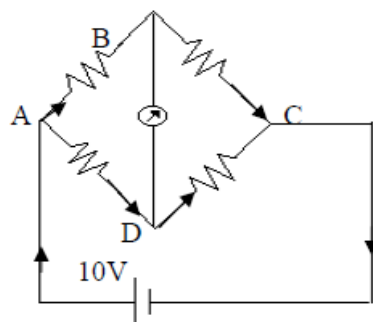
15. Two identical cells of emf 1.5V each joined in parallel provide supply to an external circuit consisting of two resistors of 17Ω each joined in parallel. A very high resistance voltmeter reads the terminal voltage of the cells to be 1.4V. What is the internal resistance each cell?



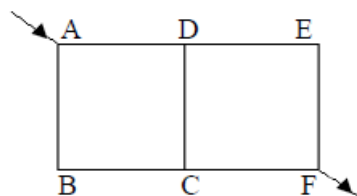
16. Find the minimum number of cells required to produce an electric current of 1.5A through resistance of 30Ω , given that emf of each cell is 1.5V and internal resistance of each cell is 10Ω .
17. A copper wire is stretched to make it 0.1% longer. What is the percentage change in the resistance?
18. Find the drift velocity of electrons in a conductor of area of cross section $10^{-4} m^2$ for a current of 15A. Assume that density of the free electrons is 7.5×10^{20} per m^3 .
19. A potential difference V is applied across a conductor of length L and diameter D . How are the electric field E and resistance R of conductor affected when in turn (a) V is halved (b) L is halved (c) D is doubled?
20. Three equal resistors connected in series across a source of emf E dissipate 10W power. What could be the power dissipated if the same resistors are connected in parallel across the same source?
21. A copper wire has square cross-section 2mm on a side. It is 4m long and carries a current of 10A. The density of free electrons is $8 \times 10^{28} m^{-3}$. (a) What is the current density of the wire? (b) What is electric field? (c) How much time is required for an electron to travel the length of the wire?
22. The potential difference across the terminals of a battery is 8.5V when there is a current of 3A in the battery from the negative to the positive terminals. When the current is 2A in the reverse direction, the P.D. becomes 11V.
(a) What is the internal resistance of the battery?



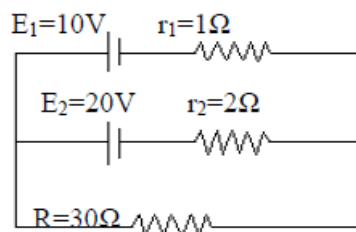
- (b) What is the emf of the battery?
23. The four arms of a Wheatstone bridge have the following resistances:
 $AB=100\Omega$
 $BC=10\Omega$
 $CD=5\Omega$
 $DA=60\Omega$



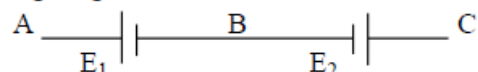
24. In a meter bridge, resistance in the right gap is 10Ω . The null point is found to occur at a distance of 30cm from the left end. Calculate the resistance in the left gap and uncertainty in its value if uncertainty in the distance of the null point is $\pm 0.5\text{cm}$.
25. Three batteries of 2, 1 and 4V with internal resistances 4Ω , 3Ω , and 2Ω respectively, are arranged in parallel. Find the current in each wire using Kirchhoff's Law.
26. A potentiometer having a wire 5m long stretched and it is connected to an accumulator having a steady voltage. A Daniel cell gives a null point at 300cm. if the length of the potentiometer wire is increased by 100cm; find the position of the balance point.
27. With two resistance wires in the two gaps of a meter bridge, the balance point was found to be $1/3\text{m}$ from the zero ends. When a 6W coil is connected in series with the smaller of the two resistances, the balance point is shifted to $2/3\text{m}$ from the same end. Find the resistance of the two wires.
28. A 10m long wire of uniform cross-section and 20Ω resistance is used in a potentiometer. The wire is connected in series with a battery of 5V along with an external resistance of 480Ω . If an unknown e.m.f. E is balanced at 6m length of the wire, calculate (a) the potential gradient of the potentiometer wire and (b) the value of unknown e.m.f.
29. All the seven arms of the electrical network shown in figure has equal lengths and equal resistances. Show that if a current I enters the network at the point A and leaves at point F, the current in the arm CD is $1/5$.



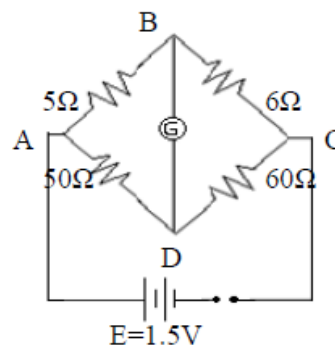
30. In comparing the resistance of two coils P and Q with a meter bridge, the balance point is obtained at 30cm from the zero ends. The coils P and Q are interchanged and the balance point is obtained at 120cm from the zero ends. Find (a) the ratio of the resistance of the two coils and (b) the length of the bridge wire
31. A cell of e.m.f. $E_1 (=2\text{V})$ and internal resistance 1Ω is connected in parallel with another cell of e.m.f. $E_2 (=1.5\text{V})$ and internal resistance 2Ω . When the combination is in parallel with a resistance of 4Ω , find the current through each branch and also the potential difference across the 4Ω resistance.
32. Three resistance are joined to form a triangle ABC, such that $AB=1\Omega$, $BC=2\Omega$, $CA=3\Omega$. A cell of e.m.f. 3V and internal resistance 1Ω is connected to points A and C. Determine the current in the three arms and also the potential difference at the cell terminals.
33. A 10V battery having an internal resistance of 1Ω is joined in parallel with another of 20V and internal resistance 2Ω . The combination is placed across an external resistance of 30Ω .



34. In an experiment, to determine the internal resistance of a cell, the null point is obtained at 220cm, when the cell is shunted by a resistance of 5Ω . When the cell is shunted by a resistance of 20Ω , the null point is obtained at 300cm. Find the internal resistance of the cell.
35. Two cells of e.m.f. E_1 and E_2 ($E_1 > E_2$) are connected as shown in figure. When a potentiometer is connected between points A and B, the balancing length of the potentiometer is at 300 cm and between points A and C, the balancing length is 100cm. Calculate the ratio of the e.m.f. of the two cells.



36. A potentiometer wire carries current. The potential difference across 70cm of it balances the potential difference across a 2Ω coil supplied by a cell of e.m.f. 2V. When a 1Ω coil is placed at parallel with the 2Ω coil, a length equal to 50cm of the potentiometer wire is required to balance the potential difference across the parallel combination. What is the internal resistance of the 2V cell?
37. ABCD is a uniform circular wire of resistance 2Ω . AOC and BOD are two wires (each of resistance 1Ω) forming diameter at right angles to each other. Show that the resistance of the network is $15/14\Omega$, if the battery is placed in AD.
38. Four resistances $P = 5\Omega$, $Q = 6\Omega$, $R = 50\Omega$, $X = 60\Omega$ are connected in the four arms of the Wheatstone bridge. If a cell of e.m.f. 1.5V and negligible internal resistance is connected across the bridge, calculate the current in the arms of the Wheatstone bridge and the cell.



39. A cell of emf 2V and internal resistance 2Ω is connected with two wires of resistance 2Ω and 5Ω in parallel. Find the current in each wire using Kirchhoff's Law.
40. Twenty four cells of internal resistance 0.5Ω and emf 1.5V are used for sending the maximum current through an external resistance of 3Ω . How will you group the cells? Find the maximum current.