PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

CAPACITANCE

Very Short Answer Type Questions 1 Mark Questions

1. What is one picofarad?

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2. Define capacitance, give its S.I unit.

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3. Define the SI unit of capacitance.

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Short Answertype Questions 2 Marks Questions

1. Find an expression for the capacity of a metallic sphere.

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2. Find an expression for the capacity of a metallic sphere.

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3. In what form is the energy stored in a charged capacitor?

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4. With the help of labelled diagram of Van-de-Graaff generator. Explain its principle, construction and working of van-de-Graaff generator.

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5. The capacitance of a parallel plate capacitor increases with

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Short Answer Type Questions 3 4 Marks Questions

1. Derive an expression for energy density of a parallel plate capacitor.

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2. Obtain the expression for the energy stored in a capacitor connected across a dc battery. Hence define energy density of the capacitor.

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3. Give the expression for the energy stored in a capacitor and an indicator.

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4. What is a parallel plate capacitor? Derive an expression for the capacitance of a parallel plate capacitor?

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5. What is a parallel plate capacitor? Derive an expression for the capacitance of a parallel plate capacitor?

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6. Derive an expression for capacitance of a parallel plate capacitor.

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7. Derive an expression for the capacitance of a parallel plate capacitor with dielectric as the medium between the plates.

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8. What is capacitor? Explain its principle.

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9. Three capacitors of capacitance C_1, C_2 and C_3 are connected in parallel. Derive an expression for the equivalent capacitance of the combination.

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10. Derive expression for the total resistance of a circuit in which a few resistors are connected in parallel.

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11. Three capacitors C_1, C_2, C_3 are Connected in series. Derive an expression for the equivalent capacitance.

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Long Answertype Questions 5 6 Marks Questions

1. Derive an expression for capacitance of a parallel plate capacitor.

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2. Derive an expression for capacitance of a parallel plate capacitor.

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3. Derive a relation for the capacitance of a parallel plate capacitor having plate separation d, when a dielectric slab of thickness t is placed between the plates.

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4. Derive an expression for the capacitance of a parallel plate capacitor with dielectric as the medium between the plates.

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5. Derive a relation for the capacitance of a parallel plate capacitor having plate separation d, when a dielectric slab of thickness t is placed between the plates.

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6. Derive an expression for the capacitance of a parallel plate capacitor with dielectric as the medium between the plates.

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7. When two charged conductors having different capacitances and different potentials are joined together, show that there is always a loss of energy.

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8. In what form is the energy stored in a charged capacitor?

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9. Explain why the capacitance of capacitor increases when dieslectric slab is inserted between plates of the capacitor.

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10. What is Van-de-Graff generator.? Write its principle with the help of a labelled diagram , explain its construction and working.

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11. How the leakage of charge can be minimised in Van de Graaff generator?

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12. With the help of labelled diagram of Van-de-Graaff generator. Explain its principle, construction and working of van-de-Graaff generator.

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13. With the help of labelled diagram of Van-de-Graaff generator. Explain its principle, construction and working of van-de-Graaff generator.

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14. What is spherical capacitor?Derive expression for its capacitance.

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15. Derive an expression for energy density of a parallel plate capacitor.

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16. Discuss the polarisation of dielectric slab placed in an electric field. What happens to the applied electric field?

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Numerical Problems

1. A parallel plate capacitor with air between the plates has a capacitance of 8 pF. The separation between the plates is now reduced by half and the space between them is filled with a medium of dielectric constant K. Calculate the value of the capacitance of the capacitor in the second case.

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2. Two capacitors of capacitance of $6\mu F$ and $12\mu F$ are connected in series with a battery. The voltage across the 6 muF capacitor is 2V. Compute the total battery voltage.

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3. How much work must be done to charge a $24uF$ capacitor, when the potential difference between the plates is 500 V?

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4. Munish has two capacitors of variable capacities of range 200 uF to 500 μF. Find the range of capacities that he can obtain from these two capacitors.

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5. Two capacitors of unknown capacities can produce maximum capacity 25 farad and

minimum 6 farad when connected together. Find the capacity of each capacitor.

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6. Munish has two capacitors of variable capacities of range 200 uF to 500 μF. Find the range of capacities that he can obtain from these two capacitors.

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7. Two capacitors of unknown capacities can produce maximum capacity 25 farad and minimum 6 farad when connected together. Find the capacity of each capacitor.

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8. Two capacitors of unknown capacities can produce maximum capacity 45 farad and minimum 10 farad when connected together. Find the capacity of each capacitor.

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9. Jagriti has two capacitor of variable capacities of range 50 uF to 250 uF. Find the range of capacities that she can obtain from these two capacitors.

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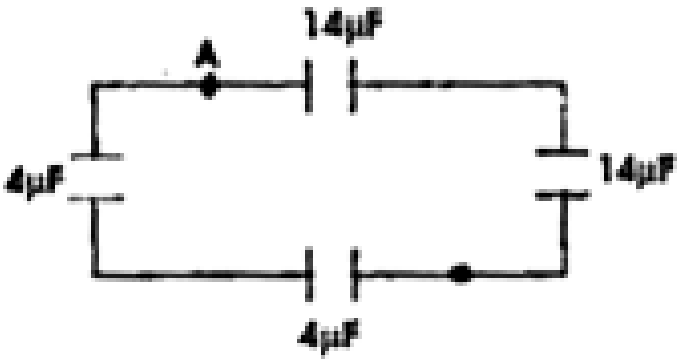
10. Ram developed a group of capacitors, as shown in figure. Calculate its equivalent

capacitance between the points A and J.



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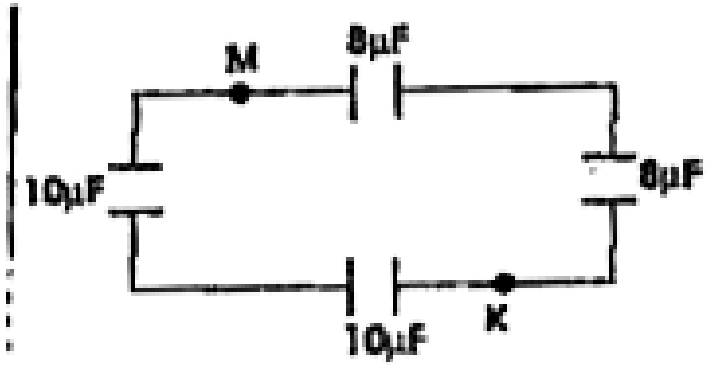
11. Kumar developed a group of capacitors as shown in figure. Calculate its equivalent

capacitance between the points Mand K.



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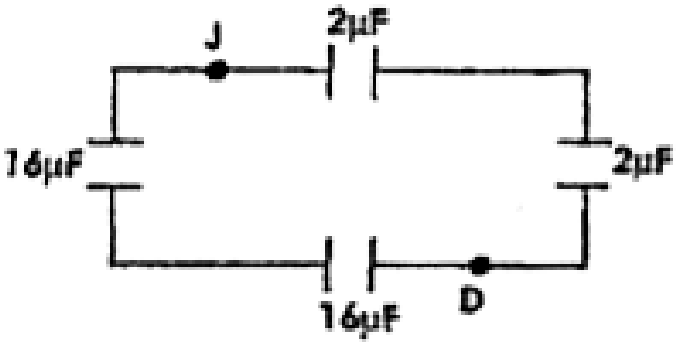
12. Mangal developed a group of capacitors as shown in figure. Calculate its equivalent

capacitance between the points J and D.



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13. A parallel plate capacitor having area $25cm^2$ and separation 1.00 mm is Connected to a battery of 6.0 V. Calculate the charge flown through the battery. How much work has

been done by the battery during this process?

$\left(Given \varepsilon_0 = 8.85 \times 10^{-12} C^2 N^{-1} m^{-2}\right)$

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14. A parallel plate capacitor with air between the plates has a capacitance of 8 pF $\left(1pF = 10^{-12} F\right)$. What will be the capacitance if the distance between the plates is reduced by half, and the space between them is filled with a substance of dielectric constant 6?

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15. In a parallel plate capacitor with air between the plates, each plate has an area of $6 \times 10^{-3} m^2$ and the distance between the plates is 3 mm. Calculate the capacitance of the capacitor. If this capacitor is connected to a 100 V supply, what is the charge on each plate of the capacitor?

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16. What should be the capacitance of a capacitor capable of storing 1j of energy when potential difference of 100V is applied between the plates?

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17. A 12pF capacitor is connected to a 50V battery. How much electrostatic energy is stored in the capacitor?

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18. What is the area of the plates of a 2F parallel plate capacitor given that te separation between the plates is 0.5 cm ?

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19. The plates of a parallel plate capacitor have an area of $90cm^2$ each and are separated by 2.5 mm. The capacitor is charged by connecting it to a 400 V supply. How much

electrostatic energy is stored by the capacitor?

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20. Three capacitors each of capacitance of $2\mu F$ are Connected in parallel across 6V battery. Find the charge in each capacitor.

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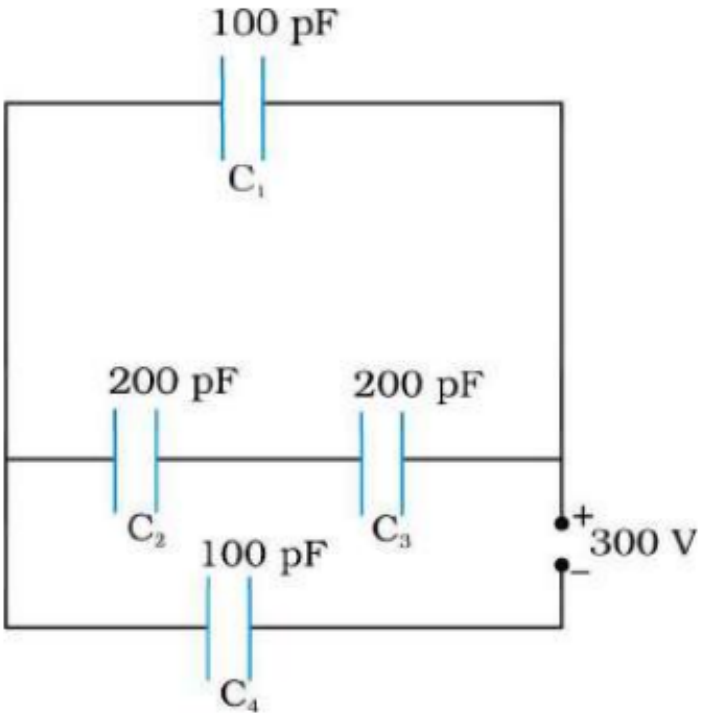
21. Obtain the equivalent capacitance of the following network in Fig. For 300 V supply, determine the charge and voltage across each capacitor. :



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Most Expected Numericals

1. Connect three capacitors of $3\mu F, 3\mu F$ and $6\mu F$ such that their equivalent capacity becomes $5\mu F$

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2. Three capacitors are having capacity in the ratio of $1:2:3$. Their equivalent capacity when connected in parallel is greater than that

when in series by $5\left(\frac{5}{11}\right)\mu F$. Find the individual capacities.

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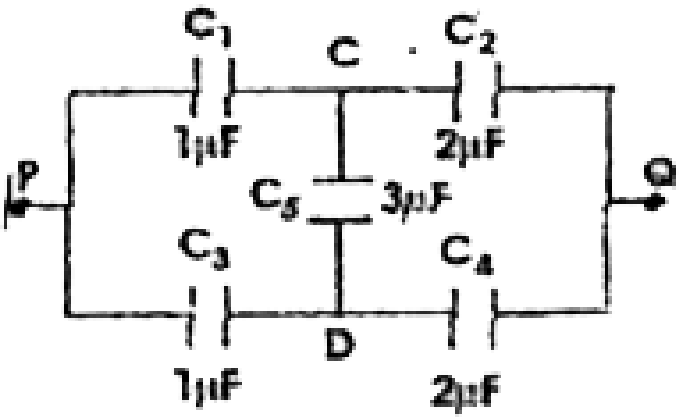
3. Calculate the equivalent capacitance of the combination between the points P and Q as shown in fig. given below :



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4. A metal of radius of 1 cm can not hold a charge of 1 coulomb. Why?

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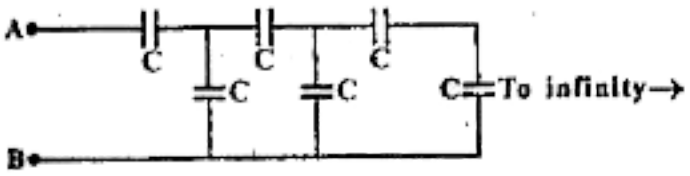
5. Find the equivalent capacitance between the terminals A and B in the given figure. Given

C=1F.



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Most Expected Questions

1. What do you mean by polarisationof light?

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2. Name the physical quantity, whose unit is CV^{-1}. Is it scalar or vector?

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3. Why the Van de Graaff generator is enclosed inside an earth connected steel tank filled with air under pressure?

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4. Can we give any desired amount of charge to a capacitor?

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5. How does a dielectric differ from an insulator?

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6. Why should circuits containing capacitor be handled cautiously, even when there is no current?

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7. Why is not possible to make a spherical conductor of capacity one farad ? Explain.

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8. On what factors does the capacitance of a parallel plate capacitor with dielectric depend?

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9. Answer carefully: Guess a possible reason why water has a much greater dielectric constant (= 80) than say, mica (= 6).

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Most Expected Questions 3 4 Marks Questions

1. Prove that the total energy stored in a parallel combination of capacitors is equal to the sum of energies stored in the individiual capacitors.

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2. What do you understand by polarisation of dielectric ? Establish the relation K $= 1 + \chi$

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