Capacitance

1. The capacity of a parallel plate condenser is $5\mu F$. When a glass plate is placed between the plates of the conductor, its potential becomes $1/8th$ of the original value. The value of dielectric constant will be

(a) 1.6 (b) 5
(c) 8 (d) 40

2. A capacitor is charged by using a battery which is then disconnected. A dielectric slab is then slipped between the plates, which results in **[NCERT 1980; MP PET 1995; BHU 1997]**

(a) Reduction of charge on the plates and increase of potential difference across the plates
(b) Increase in the potential difference across the plate, reduction in stored energy, but no change in the charge on the plates
(c) Decrease in the potential difference across the plates, reduction in the stored energy, but no change in the charge on the plates
(d) None of the above

3. The energy of a charged capacitor is given by the expression (q = charge on the conductor and C = its capacity) **[MP PMT 1989]**

(a) $\frac{q^2}{2C}$ (b) $\frac{q^2}{C}$
(c) $2qC$ (d) $\frac{q}{2C^2}$

4. The capacity of a condenser is 4×10^{-6} *farad* and its potential is $100\ volts$. The energy released on discharging it fully will be **[AFMC 1988; AIIMS 1980, 84]**

(a) $0.02\ Joule$ (b) $0.04\ Joule$
(c) $0.025\ Joule$ (d) $0.05\ Joule$

5. The insulated spheres of radii R_1 and R_2 having charges Q_1 and Q_2 respectively are connected to each other. There is **[NCERT 1971, 84; MP PMT 2001]**

(a) No change in the energy of the system
(b) An increase in the energy of the system
(c) Always a decrease in the energy of the system
(d) A decrease in the energy of the system unless $Q_1R_2 = Q_2R_1$

6. Which one statement is correct ? A parallel plate air condenser is connected with a battery. Its charge, potential, electric field and energy are Q_o, V_o, E_o and U_o respectively. In order to fill the complete space between the plates a dielectric slab is inserted, the battery is still connected. Now the corresponding values Q, V, E and U are in relation with the initially stated as **[IIT 1985]** **[MP PMT 1985]**

(a) $Q > Q_o$ (b) $V > V_o$
(c) $E > E_o$ (d) $U > U_o$

7. In a charged capacitor, the energy resides **[CPMT 1974; KCET 2000]**

(a) The positive charges
(b) Both the positive and negative charges
(c) The field between the plates
(d) Around the edge of the capacitor plates

8. The energy stored in a condenser of capacity C which has been raised to a potential V is given by **[MP PMT 1993; CPMT 1974; DCE 2002; RPET 2003]**

(a) $\frac{1}{2}CV$ (b) $\frac{1}{2}CV^2$
(c) CV (d) $\frac{1}{2VC}$

9. If two conducting spheres are separately charged and then brought in contact

(a) The total energy of the two spheres is conserved
(b) The total charge on the two spheres is conserved
(c) Both the total energy and charge are conserved
(d) The final potential is always the mean of the original potentials of the two spheres

10. Two insulated charged spheres of radii $20\ cm$ and $25\ cm$ respectively and having an equal charge Q are connected by a copper wire, then they are separated **[NCERT 1971]**

(a) Both the spheres will have the same charge Q

(b) Charge on the $20\,cm$ sphere will be greater than that on the $25\,cm$ sphere

(c) Charge on the $25\,cm$ sphere will be greater than that on the $20\,cm$ sphere

(d) Charge on each of the sphere will be $2Q$

11. Eight drops of mercury of equal radii possessing equal charges combine to form a big drop. Then the capacitance of bigger drop compared to each individual small drop is

[MP PET 1990; MNR 1987; MP PMT 2002, 03; Pb. PET 2004; J & K CET 2005]

(a) 8 times (b) 4 times

(c) 2 times (d) 32 times

12. A condenser of capacity $50\,\mu F$ is charged to $10\,volts$. Its energy is equal to

[CPMT 1978; MP PET 1994; MP PMT 2000]

(a) 2.5×10^{-3} *joule* (b) 2.5×10^{-4} *joule*

(c) 5×10^{-2} *joule* (d) 1.2×10^{-8} *joule*

13. The potential gradient at which the dielectric of a condenser just gets punctured is called

(a) Dielectric constant (b) Dielectric strength

(c) Dielectric resistance (d) Dielectric number

14. A parallel plate condenser has a capacitance $50\mu F$ in air and $110\mu F$ when immersed in an oil. The dielectric constant 'K' of the oil is **[CPMT 1985; J & K CET 2004]**

(a) 0.45 (b) 0.55

(c) 1.10 (d) 2.20

15. Separation between the plates of a parallel plate capacitor is d and the area of each plate is A. When a slab of material of dielectric constant k and thickness $t(t<d)$ is introduced between the plates, its capacitance becomes

[MP PMT 1989]

(a) $\dfrac{\varepsilon_0 A}{d+t\left(1-\frac{1}{k}\right)}$ (b) $\dfrac{\varepsilon_0 A}{d+t\left(1+\frac{1}{k}\right)}$

(c) $\dfrac{\varepsilon_0 A}{d-t\left(1-\frac{1}{k}\right)}$ (d) $\dfrac{\varepsilon_0 A}{d-t\left(1+\frac{1}{k}\right)}$

16. The capacity of parallel plate condenser depends on

[CPMT 1974; MP PMT 2000; JIPMER 2002]

(a) The type of metal used

(b) The thickness of plates

(c) The potential applied across the plates

(d) The separation between the plates

17. The energy of a charged capacitor resides in

(a) The electric field only

(b) The magnetic field only

(c) Both the electric and magnetic field

(d) Neither in electric nor magnetic field

18. No current flows between two charged bodies connected together when they have the same

[MP PMT 1984; CPMT 1971, 83]

(a) Capacitance or $\frac{Q}{V}$ ratio (b) Charge

(c) Resistance (d) Potential or $\frac{Q}{C}$ ratio

19. The capacity of a parallel plate condenser is C. Its capacity when the separation between the plates is halved will be

[CPMT 1984]

(a) $4C$ (b) $2C$

(c) $\frac{C}{2}$ (d) $\frac{C}{4}$

20. Eight small drops, each of radius r and having same charge q are combined to form a big drop. The ratio between the potentials of the bigger drop and the smaller drop is

[CPMT 1983, 89; MP PMT 1989, 94]

(a) 8 : 1 (b) 4 : 1

(c) 2 : 1 (d) 1 : 8

21. 1000 small water drops each of radius r and charge q coalesce together to form one spherical drop. The potential of the big drop is larger than that of the smaller drop by a factor of **[CPMT 1991, 97; NCERT 1984; MP PMT 1996; MP PET 2002]**

(a) 1000 (b) 100

(c) 10 (d) 1

22. A parallel plate condenser is immersed in an oil of dielectric constant 2. The field between the plates is **[CPMT 1975]**

(a) Increased proportional to 2

(b) Decreased proportional to $\frac{1}{2}$

(c) Increased proportional to $\sqrt{2}$

(d) Decreased proportional to $\frac{1}{\sqrt{2}}$

23. The capacitance of a spherical condenser is $1\mu F$. If the spacing between the two spheres is $1\,mm$, then the radius of the outer sphere is

(a) $30cm$ (b) $6m$

(c) $5cm$ (d) $3m$

24. If the dielectric constant and dielectric strength be denoted by k and x respectively, then a material suitable for use as a dielectric in a capacitor must have **[EAMCET 1986]**

(a) High k and high x (b) High k and low x

(c) Low k and low x (d) Low k and high x

25. When air in a capacitor is replaced by a medium of dielectric constant *K*, the capacity **[NCERT 1990; CPMT 1972, 82, 90; MP PMT 1993; MP PET 1994; KCET 1994]**

(a) Decreases *K* times (b) Increases *K* times

(c) Increases K^2 times (d) Remains constant

26. 64 drops each having the capacity C and potential V are combined to form a big drop. If the charge on the small drop is q, then the charge on the big drop will be **[MP PET 1985; MP PET/PMT 1988; CPMT 1971]**

(a) $2q$ (b) $4q$

(c) $16q$ (d) $64q$

27. The capacity of a parallel plate capacitor increases with the **[AFMC 1995; MH CET (Med.) 1999]**

(a) Decrease of its area (b) Increase of its distance

(c) Increase of its area (d) None of the above

28. The radius of two metallic spheres A and B are r_1 and r_2 respectively $(r_1 > r_2)$. They are connected by a thin wire and the system is given a certain charge. The charge will be greater

(a) On the surface of the sphere B

(b) On the surface of the sphere A

(c) Equal on both

(d) Zero on both

29. The capacity of a spherical conductor in MKS system is **[MP PMT 2002]**

(a) $\frac{R}{4\pi\varepsilon_0}$ (b) $\frac{4\pi\varepsilon_0}{R}$

(c) $4\pi\varepsilon_0 R$ (d) $4\pi\varepsilon_0 R^2$

30. Can a metal be used as a medium for dielectric **[DPMT 199** **[CPMT 1989]**

(a) Yes (b) No

(c) Depends on its shape (d) Depends on dielectric

31. The area of each plate of a parallel plate capacitor is $100\,cm^2$ and the distance between the plates is $1mm$. It is filled with mica of dielectric 6. The radius of the equivalent capacity of the sphere will be

(a) $47.7\ m$ (b) 4.77 m

(c) 477 m (d) None of the above

32. The respective radii of the two spheres of a spherical condenser are $12\,cm$ and $9\,cm$. The dielectric constant of the medium between them is 6. The capacity of the condenser will be

(a) $240pF$ (b) $240\mu F$

(c) $240F$ (d) None of the above

33. A parallel plate condenser is connected with the terminals of a battery. The distance between the plates is $6mm$. If a glass plate (dielectric constant $K=9$) of $4.5mm$ is introduced between them, then the capacity will become

(a) 2 times (b) The same

(c) 3 times (d) 4 times

34. The radii of two metallic spheres P and Q are r_1 and r_2 respectively. They are given the same charge. If $r_1 > r_2$. then on connecting them with a thin wire, the charge will flow

(a) From *P* to *Q*

(b) From *Q* to *P*

(c) Neither the charge will flow from *P* to *Q* nor from *Q* to *P*

(d) The information is incomplete

35. A capacitor of capacity C has charge Q and stored energy is W. If the charge is increased to $2Q$, the stored energy will be

(a) $2W$ (b) $W/2$

(c) $4W$ (d) $W/4$

36. Between the plates of a parallel plate condenser, a plate of thickness t_1 and dielectric constant k_1 is placed. In the rest of the space, there is another plate of thickness t_2 and dielectric constant k_2. The potential difference across the condenser will be

(a) $\frac{Q}{A\varepsilon_0}\left(\frac{t_1}{k_1}+\frac{t_2}{k_2}\right)$ (b) $\frac{\varepsilon_0 Q}{A}\left(\frac{t_1}{k_1}+\frac{t_2}{k_2}\right)$

(c) $\frac{Q}{A\varepsilon_0}\left(\frac{k_1}{t_1}+\frac{k_2}{t_2}\right)$ (d) $\frac{\varepsilon_0 Q}{A}(k_1 t_1 + k_2 t_2)$

37. The distance between the plates of a parallel plate condenser is $4\,mm$ and potential difference is $60\ volts$. If the distance between the plates is increased to $12\,mm$, then

(a) The potential difference of the condenser will become $180\ volts$

(b) The P.D. will become $20\ volts$

(c) The P.D. will remain unchanged

(d) The charge on condenser will reduce to one third

38. The two metallic plates of radius r are placed at a distance d apart and its capacity is C. If a plate of radius $r/2$ and thickness d of dielectric constant 6 is placed between the plates of the condenser, then its capacity will be

(a) $7C/2$ (b) $3C/7$

(c) $7C/3$ (d) $9C/4$

39. The distance between the plates of a parallel plate condenser is $8\,mm$ and P.D. $120\ volts$. If a $6\,mm$ thick slab of dielectric constant 6 is introduced between its plates, then

(a) The charge on the condenser will be doubled

(b) The charge on the condenser will be reduced to half

(c) The P.D. across the condenser will be $320\ volts$

(d) The P.D. across the condenser will be $45\ volts$

40. In a parallel plate condenser, the radius of each circular plate is $12\,cm$ and the distance between the plates is $5\,mm$. There is a glass slab of $3\,mm$ thick and of radius $12\,cm$ with dielectric constant 6 between its plates. The capacity of the condenser will be

(a) $144\times10^{-9}\,F$ (b) $40\,pF$

(c) $160\,pF$ (d) $1.44\,\mu F$

41. The true statement is, on increasing the distance between the plates of a parallel plate condenser **[MP PET 1993]**

(a) The electric intensity between the plates will decrease

(b) The electric intensity between the plates will increase

(c) The electric intensity between the plates will remain unchanged

(d) The P.D. between the plates will decrease

42. There is an air filled $1\,pF$ parallel plate capacitor. When the plate separation is doubled and the space is filled with wax, the capacitance increases to $2\,pF$. The dielectric constant of wax is **[MNR 1998; KCET 2005]**

(a) 2 (b) 4

(c) 6 (d) 8

43. The capacity and the energy stored in a parallel plate condenser with air between its plates are respectively C_o and W_o. If the air is replaced by glass (dielectric constant = 5) between the plates, the capacity of the plates and the energy stored in it will respectively be

(a) $5C_o, 5W_o$ (b) $5C_o, \frac{W_o}{5}$

(c) $\frac{C_o}{5}, 5W_o$ (d) $\frac{C_o}{5}, \frac{W_o}{5}$

44. Force of attraction between the plates of a parallel plate capacitor is

(a) $\frac{q^2}{2\varepsilon_0 AK}$ (b) $\frac{q^2}{\varepsilon_0 AK}$

(c) $\frac{q}{2\varepsilon_0 A}$ (d) $\frac{q^2}{2\varepsilon_0 A^2 K}$

45. A capacitor of capacity C is connected with a battery of potential V in parallel. The distance between its plates is reduced to half at once, assuming that the charge remains the same. Then to charge the capacitance upto the potential V again, the energy given by the battery will be

[MP PET 1989]

(a) $CV^2/4$ (b) $CV^2/2$

(c) $3CV^2/4$ (d) CV^2

46. N identical spherical drops charged to the same potential V are combined to form a big drop. The potential of the new drop will be

KCET 2000; Kerala PET 2002]

(a) V (b) V/N

(c) $V\times N$ (d) $V\times N^{2/3}$

47. One plate of parallel plate capacitor is smaller than other, then charge on smaller plate will be

(a) Less than other

(b) More than other

(c) Equal to other

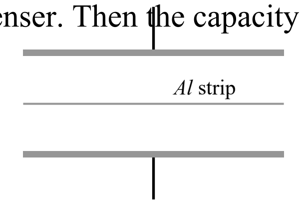
(d) Will depend upon the medium between them

48. A $6\mu F$ capacitor is charged from $10\ volts$ to $20\ volts$. Increase in energy will be **[CPMT 1987, 97; BCECE 2004]**

(a) $18\times10^{-4}\ J$ (b) $9\times10^{-4}\ J$

(c) $4.5\times10^{-4}\ J$ (d) $9\times10^{-6}\ J$

49. As shown in the figure, a very thin sheet of aluminium is placed in between the plates of the condenser. Then the capacity



(a) Will increase (b) Will decrease

(c) Remains unchanged (d) May increase or decrease

50. Twenty seven drops of water of the same size are equally and similarly charged. They are then united to form a bigger drop. By what factor will the electrical potential changes

[MP PET 1991; MP PMT 1994; RPET 2001]

(a) 9 times (b) 27 times

(c) 6 times (d) 3 times

51. The outer sphere of a spherical air capacitor is earthed. For increasing its capacitance

(a) Vacuum is created between two spheres

(b) Dielectric material is filled between the two spheres

(c) The space between two spheres is increased

(d) The earthing of the outer sphere is removed

[MP PET 1991]

52. The plates of parallel plate capacitor are charged upto $100\ V$. A $2mm$ thick plate is inserted between the plates. Then to maintain the same potential difference, the distance between the plates is increased by $1.6\ mm$. The dielectric constant of the plate is

(a) 5 (b) 1.25

(c) 4 (d) 2.5

[AIEEE 2003]

53. Force acting upon a charged particle kept between the plates of a charged condenser is F. If one plate of the condenser is removed, then the force acting on the same particle will become **[MP PMT 1991]**

(a) 0 (b) $F/2$

(c) F (d) $2F$

54. Two metallic charged spheres whose radii are 20 cm and 10 cm respectively, have each 150 $micro-coulomb$ positive charge. The common potential after they are connected by a conducting wire is **[MP PMT 1991]**

(a) $9\times10^{6}\ volts$ (b) $4.5\times10^{6}\ volts$

(c) $1.8\times10^{7}\ volts$ (d) $13.5\times10^{6}\ volts$

55. The dielectric constant k of an insulator cannot be

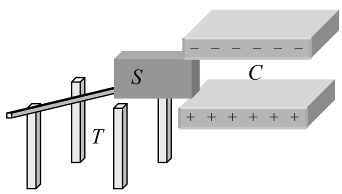
[CPMT 1974]

(a) 3 (b) 6

(c) 8 (d) ∞

56. A frictionless dielectric plate S is kept on a frictionless table T. A charged parallel plate capacitance C (of which the plates are frictionless) is kept near it. The plate S is between the plates. When the plate S is left between the plates

[CPMT 1988]



(a) It will remain stationary on the table
(b) It is pulled by the capacitor and will pass on the other end
(c) It is pulled between the plates and will remain there
(d) All the above statements are false

57. A parallel plate capacitor is charged and the charging battery is then disconnected. If the plates of the capacitor are moved further apart by means of insulating handles, then

[IIT 1987; MP PET 1992; Manipal MEE 1995; MP PMT 1996]

(a) The charge on the capacitor increases
(b) The voltage across the plates decreases
(c) The capacitance increases
(d) The electrostatic energy stored in the capacitor increases

58. A capacitor with air as the dielectric is charged to a potential of $100\ volts$. If the space between the plates is now filled with a dielectric of dielectric constant 10, the potential difference between the plates will be **[MP PET 1992]**

(a) 1000 $volts$ (b) 100 $volts$
(c) 10 $volts$ (d) Zero

59. The distance between the circular plates of a parallel plate condenser $40mm$ in diameter, in order to have same capacity as a sphere of radius $1\ metre$ is

[MP PET 1992]

(a) $0.01mm$ (b) 0.1 mm
(c) 1.0 mm (d) 10 mm

60. When a slab of dielectric material is introduced between the parallel plates of a capacitor which remains connected to a battery, then charge on plates relative to earlier charge

[MP PET 1992]

(a) Is less
(b) Is same
(c) Is more
(d) May be less or more depending on the nature of the material introduced

61. The capacitance of a metallic sphere will be $1\mu F$, if its radius is nearly

[MP PMT 1992; MH CET (Med.) 2001; UPSEAT 1999]

(a) 9 km (b) 10 m
(c) 1.11 m (d) 1.11 cm

62. A parallel plate capacitor of plate area A and plate separation d is charged to potential V and then the battery is disconnected. A slab of dielectric constant k is then inserted between the plates of the capacitors so as to fill the space between the plates. If Q, E and W denote respectively, the magnitude of charge on each plate, the electric field between the plates (after the slab is inserted) and work done on the system in question in the process of inserting the slab, then state incorrect relation from the following **[IIT 1991; MP PET 1997]**

(a) $Q = \frac{\varepsilon_0 AV}{d}$ (b) $W = \frac{\varepsilon_0 AV^2}{2kd}$
(c) $E = \frac{V}{kd}$ (d) $W = \frac{\varepsilon_0 AV^2}{2d}\left(1 - \frac{1}{k}\right)$

63. The capacitance of a parallel plate condenser does not depend on **[MP PET 1994]**

(a) Area of the plates
(b) Medium between the plates
(c) Distance between the plates
(d) Metal of the plates

64. Between the plates of a parallel plate condenser there is $1mm$ thick paper of dielectric constant 4. It is charged at $100\ volt$. The electric field in $volt/metre$ between the plates of the capacitor is

(a) 100 (b) 100000
(c) 25000 (d) 4000000

65. The electric field between the two spheres of a charged spherical condenser

(a) Is zero
(b) Is constant
(c) Increases with distance from the centre
(d) Decreases with distance from the centre

66. The distance between the plates of a parallel plate capacitor is d. A metal plate of thickness $d/2$ is placed between the plates. The capacitance would then be **[MP PMT 1994]**

(a) Unchanged (b) Halved
(c) Zero (d) Doubled

67. An uncharged capacitor is connected to a battery. On charging the capacitor

[MP PMT 1994; MP PET 1997; KCET 2002]

(a) All the energy supplied is stored in the capacitor

(b) Half the energy supplied is stored in the capacitor

(c) The energy stored depends upon the capacity of the capacitor only

(d) The energy stored depends upon the time for which the capacitor is charged

68. A capacitor is kept connected to the battery and a dielectric slab is inserted between the plates. During this process **[MP PMT 1994]**

(a) No work is done

(b) Work is done at the cost of the energy already stored in the capacitor before the slab is inserted

(c) Work is done at the cost of the battery

(d) Work is done at the cost of both the capacitor and the battery

69. The capacitance of an air capacitor is $15\mu F$ the separation between the parallel plates is $6mm$. A copper plate of $3mm$ thickness is introduced symmetrically between the plates. The capacitance now becomes **[MP PMT 1995]**

(a) $5\mu F$ (b) $7.5\mu F$

(c) $22.5\mu F$ (d) $30\mu F$

70. An air capacitor is connected to a battery. The effect of filling the space between the plates with a dielectric is to increase

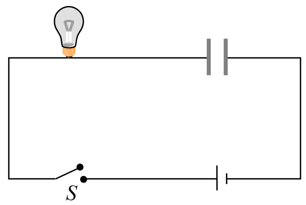
(a) The charge and the potential difference

(b) The potential difference and the electric field

(c) The electric field and the capacitance

(d) The charge and the capacitance

71. A light bulb, a capacitor and a battery are connected together as shown here, with switch S initially open. When the switch S is closed, which one of the following is true **[MP PMT 1995]**



(a) The bulb will light up for an instant when the capacitor starts charging

(b) The bulb will light up when the capacitor is fully charged

(c) The bulb will not light up at all

(d) The bulb will light up and go off at regular intervals

72. A parallel plate capacitor has a capacity C. The separation between the plates is doubled and a dielectric medium is introduced between the plates. If the capacity now becomes $2C$, the dielectric constant of the medium is **[Haryana CEE 1996]**

(a) 2 (b) 1

(c) 4 (d) 8

73. The diameter of each plate of an air capacitor is $4cm$. To make the capacity of this plate capacitor equal to that of $20cm$ diameter sphere, the distance between the plates will be

(a) $4\times10^{-3}m$ (b) $1\times10^{-3}m$

(c) $1cm$ (d) $1\times10^{-3}cm$

74. A spherical condenser has inner and outer spheres of radii a and b respectively. The space between the two is filled with air. The difference between the capacities of two condensers formed when outer sphere is earthed and when inner sphere is earthed will be **[MP PET 1996]**

(a) Zero (b) $4\pi\varepsilon_0 a$

(c) $4\pi\varepsilon_0 b$ (d) $4\pi\varepsilon_0 a\left(\frac{b}{b-a}\right)$

[MP PMT 1995]

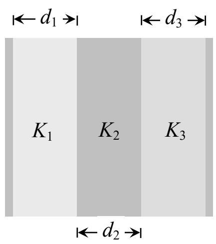
75. The expression for the capacity of the capacitor formed by compound dielectric placed between the plates of a parallel plate capacitor as shown in figure, will be (area of plate $= A$)

(a) $\frac{\varepsilon_0 A}{\left(\frac{d_1}{K_1}+\frac{d_2}{K_2}+\frac{d_3}{K_3}\right)}$

(b) $\frac{\varepsilon_0 A}{\left(\frac{d_1+d_2+d_3}{K_1+K_2+K_3}\right)}$

(c) $\frac{\varepsilon_0 A(K_1K_2K_3)}{d_1d_2d_3}$

(d) $\varepsilon_0\left(\frac{AK_1}{d_1}+\frac{AK_2}{d_2}+\frac{AK_3}{d_3}\right)$



76. The intensity of electric field at a point between the plates of a charged capacitor

(a) Is directly proportional to the distance between the plates

(b) Is inversely proportional to the distance between the plates

(c) Is inversely proportional to the square of the distance between the plates

(d) Does not depend upon the distance between the plates

77. The capacity of a condenser in which a dielectric of dielectric constant 5 has been used, is C. If the dielectric is replaced by another with dielectric constant 20, the capacity will become **[MP PMT 1996]**

(a) $\frac{C}{4}$ (b) $4C$

(c) $\frac{C}{2}$ (d) $2C$

78. In a spherical condenser radius of the outer sphere is R. The different in the radii of outer and inner sphere in x. Its capacity is proportional to

(a) $\frac{xR}{(R-x)}$ (b) $\frac{x(R-x)}{r}$

(c) $\frac{R(R-x)}{x}$ (d) $\frac{R}{x}$

79. A capacitor when filled with a dielectric $K=3$ has charge Q_0, voltage V_0 and field E_0. If the dielectric is replaced with another one having $K=9$ the new values of charge, voltage and field will be respectively

(a) $3Q_0, 3V_0, 3E_0$ (b) $Q_0, 3V_0, 3E_0$

(c) $Q_0, \frac{V_0}{3}, 3E_0$ (d) $Q_0, \frac{V_0}{3}, \frac{E_0}{3}$

80. A charge of $10^{-9}C$ is placed on each of the 64 identical drops of radius $2cm$. They are then combined to form a bigger drop. Find its potential **[MP PET 1997]**

(a) $7.2\times10^3 V$ (b) $7.2\times10^2 V$

(c) $1.44\times10^2 V$ (d) $1.44\times10^3 V$

81. 125 identical drops each charged to the same potential of $50\ volts$ are combined to form a single drop. The potential of the new drop will be **[MP PET 1997]**

(a) $50\ V$ (b) $250\ V$

(c) $500\ V$ (d) $1250\ V$

82. The plates of a parallel plate capacitor of capacity $50\mu C$ are charged to a potential of $100\ volts$ and then separated from each other so that the distance between them is doubled. How much is the energy spent in doing so **[MP PET 1997; JIPMER 2000]**

(a) $25\times10^{-2} J$ (b) $-12.5\times10^{-2} J$

(c) $-25\times10^{-2} J$ (d) $12.5\times10^{-2} J$

83. Two spherical conductors each of capacity C are charged to potentials V and $-V$. These are then connected by means of a fine wire. The loss of energy will be **[MP PMT 1997]**

(a) Zero (b) $\frac{1}{2}CV^2$

(c) CV^2 (d) $2CV^2$

84. The area of the plates of a parallel plate condenser is A and the distance between the plates is $10mm$. There are two dielectric sheets in it, one of dielectric constant 10 and thickness $6mm$ and the other of dielectric constant 5 and thickness $4mm$. The capacity of the condenser is **[MP PMT 1997]**

(a) $\frac{12}{35}\varepsilon_0 A$ (b) $\frac{2}{3}\varepsilon_0 A$

(c) $\frac{5000}{7}\varepsilon_0 A$ (d) $1500\ \varepsilon_0 A$

85. An air capacitor of capacity $C=10\mu F$ is connected to a constant voltage battery of $12\ V$. Now the space between the plates is filled with a liquid of dielectric constant 5. The charge that flows now from battery to the capacitor is **[MP PMT 1997]**

(a) $120\mu C$ (b) $699\mu C$

(c) $480\mu C$ (d) $24\mu C$

86. A parallel plate capacitor is first charged and then a dielectric slab is introduced between the plates. The quantity that remains unchanged is

(a) Charge Q (b) Potential V

(c) Capacity C (d) Energy U

87. A $2\mu F$ capacitor is charged to 100 $volt$ and then its plates are connected by a conducting wire. The heat produced is

[MP PET 1999; Pb. PET 2003]

(a) $1\,J$ (b) $0.1\,J$

(c) $0.01\,J$ (d) $0.001\,J$

88. The force between the plates of a parallel plate capacitor of capacitance C and distance of separation of the plates d with a potential difference V between the plates, is

[MP PMT 1999]

(a) $\frac{CV^2}{2d}$ (b) $\frac{C^2V^2}{2d^2}$

(c) $\frac{C^2V^2}{d^2}$ (d) $\frac{V^2d}{C}$

89. Two metal spheres of capacitance C_1 and C_2 carry some charges. They are put in contact and then separated. The final charges Q_1 and Q_2 on them will satisfy

[MP PMT 1999]

(a) $\frac{Q_1}{Q_2} < \frac{C_1}{C_2}$ (b) $\frac{Q_1}{Q_2} = \frac{C_1}{C_2}$

(c) $\frac{Q_1}{Q_2} > \frac{C_1}{C_2}$ (d) $\frac{Q_1}{Q_2} < \frac{C_2}{C_1}$

90. A parallel plate condenser with oil between the plates (dielectric constant of oil $K = 2$) has a capacitance C. If the oil is removed, then capacitance of the capacitor becomes

[CBSE PMT 1999; MH CET 2000]

(a) $\sqrt{2}C$ (b) $2C$

(c) $\frac{C}{\sqrt{2}}$ (d) $\frac{C}{2}$

91. What is the area of the plates of a $3F$ parallel plate capacitor, if the separation between the plates is $5mm$

[AIIMS 1998; Pb. PET 2000; BHU 2002]

(a) $1.694 \times 10^9\,m^2$ (b) $4.529 \times 10^9\,m^2$

(c) $9.281 \times 10^9\,m^2$ (d) $12.981 \times 10^9\,m^2$

92. A parallel plate capacitor has circular plates of $0.08m$ radius and $1.0 \times 10^{-3}m$ separation. If a P.D. of $100\,volt$ is applied, the charge will be

[ISM Dhanbad 1994]

(a) $1.8 \times 10^{-10}\,C$ (b) $1.8 \times 10^{-8}\,C$

(c) $1.8 \times 10^{-20}\,C$ (d) None of these

93. The capacity of a parallel plate condenser is $10\mu F$ without dielectric. Dielectric of constant 2 is used to fill half the distance between the plates, the new capacitance in μF is

[EAMCET (Engg.) 1995]

(a) 10 (b) 20

(c) 15 (d) 13.33

94. The energy stored in the condenser is

[EAMCET (Engg.) 1995; CPMT 2000; CBSE PMT 2001]

(a) QV (b) $\frac{1}{2}QV$

(c) $\frac{1}{2}C$ (d) $\frac{1}{2}\frac{Q}{C}$

95. The capacitance of an air filled parallel plate capacitor is $10\mu\mu F$. The separation between the plates is doubled and the space between the plates is then filled with wax giving the capacitance a new value of $40 \times 10^{-12}\,farads$. The dielectric constant of wax is

(a) 12.0 (b) 10.0

(c) 8.0 (d) 4.2

96. Two identical charged spherical drops each of capacitance *C* merge to form a single drop. The resultant capacitance is

[AFMC 1993]

(a) Equal to $2C$

(b) Greater than $2C$

(c) Less than $2C$ but greater than *C*

(d) Less than *C*

97. A condenser having a capacity 2.0 micro *farad* is charged to $200\,volts$ and then the plates of the capacitor are connected to a resistance wire. The heat produced in joules will be

[KCET 1992; JIPMER 2000]

(a) $4 \times 10^4\,J$ (b) $4 \times 10^{10}\,J$

(c) $4 \times 10^{-2}\,J$ (d) $2 \times 10^{-2}\,J$

98. The radius of a metallic sphere if its capacitance is $1/9\,F$, is

[KCET 1999; Pb. PET 2001]

(a) $10^6\,m$ (b) $10^7\,m$

(c) $10^9\,m$ (d) $10^8\,m$

99. The ratio of charge to potential of a body is known as

[CPMT 1999; MH CET 2001; Pb. PMT 2004]

(a) Capacitance (b) Conductance

(c) Inductance (d) Resistance

100. If the capacity of a spherical conductor is 1 *picofarad*, then its diameter, would be

(a) $1.8 \times 10^{-3}\,m$ (b) $18 \times 10^{-3}\,m$

(c) $1.8\times10^{-5} m$ (d) $18\times10^{-7} m$

101. A parallel plate air capacitor is charged to a potential difference of V. After disconnecting the battery, distance between the plates of the capacitor is increased using an insulating handle. As a result, the potential difference between the plates **[KCET 1999]**

(a) Decreases (b) Increases

(c) Becomes zero (d) Does not change

102. A $10 pF$ capacitor is connected to a 50 V battery. How much electrostatic energy is stored in the capacitor

[KCET 1999]

(a) $1.25\times10^{-8} J$ (b) $2.5\times10^{-7} J$

(c) $3.5\times10^{-5} J$ (d) $4.5\times10^{-2} J$

103. Two protons A and B are placed in space between plates of a parallel plate capacitor charged upto V *volts* (See fig.) Forces on protons are F_A and F_B, then

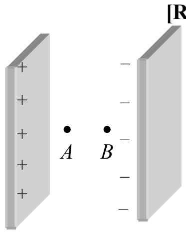
[RPET 1999]

(a) $F_A > F_B$

(b) $F_A < F_B$

(c) $F_A = F_B$

(d) Nothing can be said



104. If a slab of insulating material $4\times10^{-3} m$ thick is introduced between the plates of a parallel plate capacitor, the separation between plates has to be increased by $3.5\times10^{-3} m$ to restore the capacity to original value. The dielectric constant of the material will be **[AMU (Med.) 1999]**

(a) 6 (b) 8

(c) 10 (d) 12

105. When a dielectric material is introduced between the plates of a charged condenser then electric field between the plates

[Pb. PMT 1999]

(a) Decreases (b) Increases

(c) Remain constant (d) First (b) then (a)

106. A parallel plate capacitor has a plate separation of 0.01 *mm* and use a dielectric (whose dielectric strength is 19 *KV*/*mm*) as an insulator. The maximum potential difference that can be applied to the terminals of the capacitor is

[AMU (Engg.) 1999]

(a) 190 V (b) 290 V

(c) 95 V (d) 350 V

107. Sixty-four drops are jointed together to form a bigger drop. If each small drop has a capacitance C, a potential V, and a charge q, then the capacitance of the bigger drop will be

[AMU (Engg.) 1999]

(a) C (b) $4C$

(c) $16C$ (d) $64C$

108. A $700 pF$ capacitor is charged by a $50 V$ battery. The electrostatic energy stored by it is

(a) $17.0\times10^{-8} J$ (b) $13.6\times10^{-9} J$

(c) $9.5\times10^{-9} J$ (d) $8.7\times10^{-7} J$

109. A variable condenser is permanently connected to a 100 V battery. If the capacity is changed from $2\mu F$ to $10\mu F$, then change in energy is equal to **[BHU 2000]**

(a) $2\times10^{-2} J$ (b) $2.5\times10^{-2} J$

(c) $3.5\times10^{-2} J$ (d) $4\times10^{-2} J$

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

[AFMC 2000]

(a) $1.5\times10^{-8} J$ (b) $2.5\times10^{-7} J$

(c) $3.5\times10^{-5} J$ (d) $4.5\times10^{-2} J$

111. The capacity of a parallel plate condenser is $15\mu F$, when the distance between its plates is 6 *cm*. If the distance between the plates is reduced to 2 *cm*, then the capacity of this parallel plate condenser will be **[AFMC 2000]**

(a) $15\mu F$ (b) $30\mu F$

(c) $45\mu F$ (d) $60\mu F$

112. When we touch the terminals of a high voltage capacitor, even after a high voltage has been cut off, then the capacitor has a tendency to

(a) Restore energy (b) Discharge energy

(c) Affect dangerously (d) Both (b) and (c)

113. In a capacitor of capacitance $20\mu F$, the distance between the plates is $2mm$. If a dielectric slab of width $1mm$ and dielectric constant 2 is inserted between the plates, then the new capacitance is **[BHU 2000]**

(a) $2\mu F$ (b) $15.5\mu F$

(c) $26.6\mu F$ (d) $32\mu F$

114. A metallic sheet is inserted between the plates of a parallel plate capacitor. The capacitance of the capacitor **[Roorkee 2000]**

(a) Increases

(b) Is independent of the position of the sheet

(c) Is maximum when the metal sheet in the middle

(d) Is maximum when the metal sheet touches one of the capacitor plates

115. The capacity of a parallel plate capacitor with no dielectric substance but with a separation of 0.4 *cm* is $2\mu F$. The separation is reduced to half and it is filled with a dielectric substance of value 2.8. The final capacity of the capacitor is **[CBSE PMT 2000]**

(a) $11.2\mu F$ (b) $15.6\mu F$

(c) $19.2\mu F$ (d) $22.4\mu F$

116. Two insulated metallic spheres of $3\mu F$ and $5\mu F$ capacitances are charged to 300 *V* and 500*V* respectively. The energy loss, when they are connected by a wire is **[CPMT 1999; KCET 2000; Pb. PMT 1999, 2001]**

(a) 0.012 *J* (b) 0.0218 *J*

(c) 0.0375 *J* (d) 3.75 *J*

117. Two conducting spheres of radii 5 *cm* and 10 *cm* are given a charge of $15\mu C$ each. After the two spheres are joined by a conducting wire, the charge on the smaller sphere is **[AMU (Engg.) 2001]**

(a) $5\ \mu C$ (b) $10\mu C$

(c) $15\mu C$ (d) $20\mu C$

118. In a parallel plate capacitor of capacitance *C,* a metal sheet is inserted between the plates, parallel to them. If the thickness of the sheet is half of the separation between the plates. The capacitance will be **[KCET 2001]**

(a) $\frac{C}{2}$ (b) $\frac{3C}{4}$

(c) $4C$ (d) $2C$

119. While a capacitor remains connected to a battery and dielectric slab is applied between the plates, then **[KCET 2001]**

(a) Potential difference between the plates is changed

(b) Charge flows from the battery to the capacitor

(c) Electric field between the plates increases

(d) Energy store in the capacitor decreases

120. A body of capacity $4\mu F$ is charged to $80\ V$ and another body of capacity $6\mu F$ is charged to 30*V*. When they are connected the energy lost by $4\mu F$ capacitor is **[EAMCET 2001]**

(a) 7.8 *mJ* (b) 4.6 *mJ*

(c) 3.2 *mJ* (d) 2.5 *mJ*

121. The capacity of the conductor does not depend upon **[BHU 2001]**

(a) Charge (b) Voltage

(c) Nature of the material (d) All of these

122. A solid conducting sphere of radius R_1 is surrounded by another concentric hollow conducting sphere of radius R_2. The capacitance of this assembly is proportional to **[MP PET 2001; UPSEAT 2001]**

(a) $\frac{R_2 - R_1}{R_1 R_2}$ (b) $\frac{R_2 + R_1}{R_1 R_2}$

(c) $\frac{R_1 R_2}{R_1 + R_2}$ (d) $\frac{R_1 R_2}{R_2 - R_1}$

123. Two spherical conductors *A* and *B* of radius *a* and *b* ($b > a$) are placed in air concentrically *B* is given charge + *Q coulomb* and *A* is grounded. The equivalent capacitance of these is **[MP PMT 2001]**

(a) $4\pi\varepsilon_0 \frac{ab}{b-a}$ (b) $4\pi\varepsilon_0 (a+b)$

(c) $4\pi\varepsilon_0 b$ (d) $4\pi\varepsilon_0 \frac{b^2}{b-a}$

124. The capacity of a parallel plate condenser is $10\mu F$, when the distance between its plates is 8 *cm*. If the distance between the plates is reduced to 4 *cm*, then the capacity of this parallel plate condenser will be **[CBSE PMT 2001]**

(a) $5\mu F$ (b) $10\mu F$
(c) $20\mu F$ (d) $40\mu F$

125. A capacitor is used to store 24 *watt* hour of energy at 1200 *volt*. What should be the capacitance of the capacitor [Kerala (Engg.) 2001]
(a) $120 mF$ (b) $120\mu F$
(c) $24\mu F$ (d) $24 mF$

126. The mean electric energy density between the plates of a charged capacitor is (here q= charge on the capacitor and A= area of the capacitor plate) [MP PET 2002]
(a) $\frac{q^2}{2\varepsilon_0 A^2}$ (b) $\frac{q}{2\varepsilon_0 A^2}$
(c) $\frac{q^2}{2\varepsilon_0 A}$ (d) None of the above

127. A charge of $40\mu C$ is given to a capacitor having capacitance $C = 10\mu F$. The stored energy in ergs is [CPMT 2002]
(a) 80×10^{-6} (b) 800
(c) 80 (d) 8000

128. Work done by an external agent in separating the parallel plate capacitor is [AIEEE 2002]
(a) CV (b) $\frac{1}{2}C^2V$
(c) $\frac{1}{2}CV^2$ (d) None of these

129. A parallel plate capacitor has an electric field of $10^5\ V/m$ between the plates. If the charge on the capacitor plate is $1\mu C$, the force on each capacitor plate is [Orissa JEE 2002]
(a) $0.5\ N$ (b) $0.05\ N$
(c) $0.005\ N$ (d) None of these

130. A parallel plate capacitor has plate area *A* and separation *d*. It is charged to a potential difference V_0. The charging battery is disconnected and the plates are pulled apart to three times the initial separation. The work required to separate the plates is [Kerala PET 2002]
(a) $\frac{3\varepsilon_0 AV_0^2}{d}$ (b) $\frac{\varepsilon_0 AV_0^2}{2d}$
(c) $\frac{\varepsilon_0 AV_0^2}{3d}$ (d) $\frac{\varepsilon_0 AV_0^2}{d}$

131. The electric field between the plates of a parallel plate capacitor when connected to a certain battery is E_0. If the space between the plates of the capacitor is filled by introducing a material of dielectric constant *K* without disturbing the battery connections, the field between the plates shall be
(a) KE_0 (b) E_0
(c) $\frac{E_0}{K}$ (d) None of the above

132. If the distance between parallel plates of a capacitor is halved and dielectric constant is doubled then the capacitance
(a) Decreases two times (b) Increases two times
(c) Increases four times (d) Remain the same

133. Putting a dielectric substance between two plates of condenser, capacity, potential and potential energy respectively
(a) Increase, decrease, decrease
(b) Decrease, increase, increase
(c) Increase, increase, increase
(d) Decrease, decrease, decrease

134. A thin metal plate *P* is inserted half way between the plates of a parallel plate capacitor of capacitance *C* in such a way that it is parallel to the two plates. The capacitance now becomes [Orissa JEE 2002]
(a) *C* (b) *C*/2
(c) 4*C* (d) None of these

135. If there are *n* capacitors in parallel connected to *V volt* source, then the energy stored is equal to [AIEEE 20
(a) *CV* (b) $\frac{1}{2}nCV^2$
(c) CV^2 (d) $\frac{1}{2n}CV^2$

136. If *n* drops, each of capacitance *C*, coalesce to form a single big drop, then the ratio of the energy stored in the big drop to that in each small drop will be [UPSEAT 2002]
(a) n : 1 (b) $n^{1/3}$: 1
(c) $n^{5/3}$: 1 (d) n^2 : 1

137. A conducting sphere of radius 10*cm* is charged $10\mu C$. Another uncharged sphere of radius 20

cm is allowed to touch it for some time. After that if the sphere are separated, then surface density of charges, on the spheres will be in the ratio of **[AIIMS 2002]**

(a) 1 : 4 (b) 1 : 3

(c) 2 : 1 (d) 1 : 1

138. 64 small drops of mercury, each of radius *r* and charge *q* coalesce to form a big drop. The ratio of the surface density of charge of each small drop with that of the big drop is **[KCET 2002]**

(a) 1 : 64 (b) 64 : 1

(c) 4 : 1 (d) 1 : 4

139. Capacitance (in *F*) of a spherical conductor with radius 1*m* is **[AIEEE 2002]**

(a) 1.1×10^{-10} (b) 10^{-6}

(c) 9×10^{-9} (d) 10^{-3}

140. A condenser has a capacity $2\mu F$ and is charged to a voltage of 50 *V*. The energy stored is **[MH CET 2002]**

(a) 25 × 10^5 *Joule* (b) 25 *Joule*

(c) 25 × 10 *erg* (d) 25 × 10^3 *erg*

141. The energy required to charge a capacitor of $5\mu F$ by connecting a *d.c.* source of 20 *kV* is **[Pb. PMT 2002]**

(a) 10 *kJ* (b) 5 *kJ*

(c) 2 *kJ* (d) 1 *kJ*

142. The capacitance of a parallel plate capacitor is $12\mu F$. If the distance between the plates is doubled and area is halved, then new capacitance will be **[MH CET 2002]**

(a) $8\mu F$ (b) $6\mu F$

(c) $4\mu F$ (d) $3\mu F$

143. A capacitor of capacitance $6\mu F$ is charged upto 100 *volt*. The energy stored in the capacitor is **[BHU 2003; CPMT 2004; MP PMT 2005]**

(a) 0.6 *Joule* (b) 0.06 *Joule*

(c) 0.03 *Joule* (d) 0.3 *Joule*

144. A parallel plate air capacitor is charged and then isolated. When a dielectric material is inserted between the plates of the capacitor, then which of the following does not change **[Orissa JEE 2003]**

(a) Electric field between the plates

(b) Potential difference across the plates

(c) Charge on the plates

(d) Energy stored in the capacitor

145. Capacitance of a parallel plate capacitor becomes 4/3 times its original value if a dielectric slab of thickness *t* = *d*/2 is inserted between the plates (*d* is the separation between the plates). The dielectric constant of the slab is **[KCET 2003]**

(a) 8 (b) 4

(c) 6 (d) 2

146. A 10 *micro-farad* capacitor is charged to 500 *V* and then its plates are joined together through a resistance of 10 *ohm*. The heat produced in the resistance is **[Orissa JEE 2003]**

(a) 500 *J* (b) 250 *J*

(c) 125 *J* (d) 1.25 *J*

147. The unit of electric permittivity is

(a) *Volt/m*^{2} (b) *Joule/coulomb*

(c) *Farad/m* (d) *Henry/m*

148. The work done in placing a charge of 8×10^{-18} *coulomb* on a condenser of capacity 100 *micro-farad* is **[AIEEE 2003]**

(a) 32×10^{-32} *Joule* (b) 16×10^{-32} *Joule*

(c) 3.1×10^{-26} *Joule* (d) 4×10^{-10} *Joule*

149. 64 drops of mercury each charged to a potential of $10V$. They are combined to form one bigger drop. The potential of this drop will be (Assume all the drops to be spherical) **[MP PET 2003]**

(a) 160 *V* (b) 80 *V*

(c) 10 *V* (d) 640 *V*

150. A spherical drop of mercury having a potential of 2.5 *V* is obtained as a result of merging 125 droplets. The potential of constituent droplets would be **[Orissa JEE 2003]**

(a) 1.0 *V* (b) 0.5 *V*

(c) 0.2 *V* (d) 0.1 *V*

151. A parallel plate capacitor of capacity C_0 is charged to a potential V_0

(i) The energy stored in the capacitor when the battery is disconnected and the separation is doubled E_1

(ii) The energy stored in the capacitor when the charging battery is kept connected and the separation between the capacitor plates is doubled is E_2. Then E_1 / E_2 value is

(a) 4 (b) 3/2

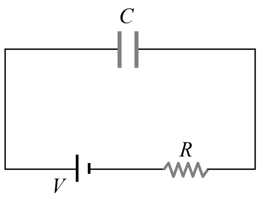
(c) 2 (d) 1/2

152. A parallel plate capacitor carries a charge q. The distance between the plates is doubled by application of a force. The work done by the force is **[MP PET 2003]**

(a) Zero (b) $\frac{q^2}{C}$

(c) $\frac{q^2}{2C}$ (d) $\frac{q^2}{4C}$

153. As in figure shown, if a capacitor *C* is charged by connecting it with resistance *R*, then energy is given by the battery will be



(a) $\frac{1}{2}CV^2$

(b) More than $\frac{1}{2}CV^2$

(c) Less than $\frac{1}{2}CV^2$

(d) Zero

154. A capacitor is charged to 200 *volt* it has 0.1 *coulomb* charge. When it is discharged, energy will be **[MP PET 2003]**

(a) 1 *J* (b) 4 *J*

(c) 10 *J* (d) 20 *J*

155. If eight identical drops are joined to form a bigger drop, the potential on bigger as compared to that on smaller drop will be

(a) Double (b) Four times

(c) Eight times (d) One time

156. If a dielectric substance is introduced between the plates of a charged air-gap capacitor. The energy of the capacitor will **[MP PMT 2004]**

(a) Increase

(b) Decrease

(c) Remain unchanged

(d) First decrease and then increase

157. A 40 μF capacitor in a defibrillator is charged to 3000 *V*. The energy stored in the capacitor is sent through the patient during a pulse of duration 2*ms*. The power delivered to the patient is **[EAMCET 2003]** **[AIIMS 2004]**

(a) 45 *kW* (b) 90 *kW*

(c) 180 *kW* (d) 360 *kW*

158. A spherical drop of capacitance 1 μF is broken into eight drops of equal radius. Then, the capacitance of each small drop is ......

(a) $\frac{1}{8}\mu F$ (b) $8\mu F$

(c) $\frac{1}{2}\mu F$ (d) $\frac{1}{4}\mu F$

159. An air filled parallel plate capacitor has capacity C. If distance between plates is doubled and it is immersed in a liquid then capacity becomes twice. Dielectric constant of the liquid is **[MP PMT 2003]** **[BCECE 2004]**

(a) 1 (b) 2

(c) 3 (d) 4

160. On increasing the plate separation of a charged condenser, the energy **[Kerala PMT 2004]**

(a) Increases (b) Decreases

(c) Remains unchanged (d) Becomes zero

161. The energy stored in a condenser is in the form of **[J & K CET 2004]**

(a) Kinetic energy (b) Potential energy

(c) Elastic energy (d) Magnetic energy **[RPMT 2002]**

162. When a dielectric material is introduced between the plates of a charges condenser, then electric field between the plates **[Pb PMT 2004]**

(a) Remain constant

(b) Decreases

(c) Increases

(d) First increases then decreases

163. When a lamp is connected in series with capacitor, then **[Pb. PMT 2004]**

(a) Lamp will not glow (b) Lamp will burst out

(c) Lamp will glow normally (d) None of these

164. If the potential of a capacitor having capacity of 6 μF is increased from 10 V to 20 V, then increase in its energy will be

(a) $12 \times 10^{-6}\ J$ (b) $9 \times 10^{-4}\ J$

(c) $4 \times 10^{-6}\ J$ (d) $4 \times 10^{-9}\ J$

165. A 4 μF condenser is charged to 400 V and then its plates are joined through a resistance. The heat produced in the resistance is

(a) 0.16 J (b) 0.32 J

(c) 0.64 J (d) 1.28 J

166. A parallel plate capacitor having a plate separation of 2 mm is charged by connecting it to a 300 V supply. The energy density is

(a) 0.01 J/m^3 (b) 0.1 J/m^3

(c) 1.0 J/m^3 (d) 10 J/m^3

167. The capacity of an air condenser is 2.0 μF. If a medium is placed between its plates. The capacity becomes 12 μF. The dielectric constant of the medium will be **[Pb. PMT 2003]**

(a) 5 (b) 4

(c) 3 (d) 6

168. If the distance between the plates of parallel plate capacitor is halved and the dielectric constant of dielectric is doubled, then its capacity will **[MH CET 2003]**

(a) Increase by 16 times (b) Increase by 4 times

(c) Increase by 2 times (d) Remain the same

169. Two metallic spheres of radii $1\,cm$ and $2\,cm$ are given charges $10^{-2}\,C$ and $5\times 10^{-2}\,C$ respectively. If they are connected by a conducting wire, the final charge on the smaller sphere is

(a) $3\times 10^{-2}\,C$ (b) $1\times 10^{-2}\,C$

(c) $4\times 10^{-2}\,C$ (d) $2\times 10^{-2}\,C$

170. The potentials of the two plates of capacitor are +10V and –10 V. The charge on one of the plates is 40 C. The capacitance of the capacitor is **[AFMC 2005]**

(a) 2 F (b) 4 F

(c) 0.5 F (d) 0.25 F

171. The potential to which a conductor is raised, depends on **[Pb. PET 2002]** **[KCET 2005]**

(a) The amount of charge

(b) Geometry and size of the conductor

(c) Both (a) and (b)

(d) Only on (a) **[UPSEAT 2004]**

Grouping of Capacitors

1. Two identical capacitors are joined in parallel, charged to a potential V and then separated and then connected in series *i.e.* the positive plate of one is connected to negative of the other **[BHU 2004]** **[NCERT 1972, 73,**

(a) The charges on the free plates connected together are destroyed

(b) The charges on the free plates are enhanced

(c) The energy stored in the system increases

(d) The potential difference in the free plates becomes $2V$

2. The condensers of capacity C_1 and C_2 are connected in parallel, then the equivalent capacitance is **[NCERT 1977; KCET 2000; DPMT 2002; MP PMT 2004]**

(a) $C_1 + C_2$ (b) $\frac{C_1 C_2}{C_1 + C_2}$

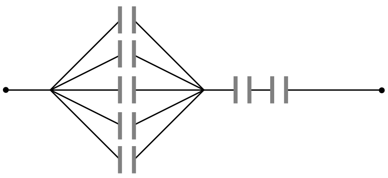
(c) $\frac{C_1}{C_2}$ (d) $\frac{C_2}{C_1}$

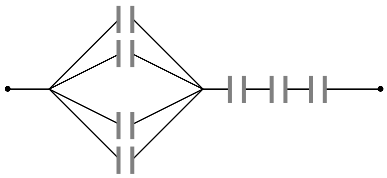
3. A parallel plate capacitor is made by stacking n equally spaced plates connected alternately. If the capacitance between any two plates is C then the resultant capacitance is **[CBSE PMT 1995]** **[NCERT 1971; DPMT 2001; MP PMT 2003; AIEEE 2005]**

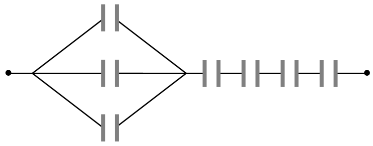
(a) C (b) nC

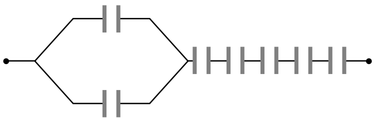
(c) $(n-1)C$ (d) $(n+1)C$

4. Seven capacitors each of capacity $2\mu F$ are to be so connected to have a total capacity $\frac{10}{11}\mu F$. Which will be the necessary figure as shown

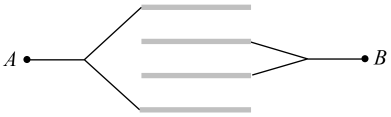
(a) 

(b) 

(c) 

(d) 

5. Four plates of equal area A are separated by equal distances d and are arranged as shown in the figure. The equivalent capacity is



(a) $\frac{2\varepsilon_0 A}{d}$ (b) $\frac{3\varepsilon_0 A}{d}$

(c) $\frac{3\varepsilon_0 A}{d}$ (d) $\frac{\varepsilon_0 A}{d}$

6. The capacitor of capacitance $4\mu F$ and $6\mu F$ are connected in series. A potential difference of $500\ volts$ applied to the outer plates of the two capacitor system. Then the charge on each capacitor is numerically

(a) $6000\ C$ (b) $1200\ C$

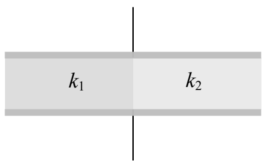
(c) $1200\ \mu C$ (d) $6000\ \mu C$

7. A parallel plate capacitor with air as medium between the plates has a capacitance of $10\mu F$. The area of capacitor is divided into two equal halves and filled with two media as shown in the figure having dielectric constant $k_1 = 2$ and $k_2 = 4$. The capacitance of the system will now be

[MP PMT 1987; RPET 2001]

(a) $10\mu F$

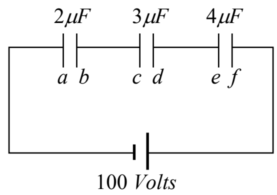
(b) $20\mu F$



(c) $30\mu F$

(d) $40\mu F$

8. Three capacitors are connected to $D.C.$ source of $100\ volts$ shown in the adjoining figure. If the charge accumulated on plates of C_1, C_2 and C_3 are q_a, q_b, q_c, q_d, q_e and q_f respectively, then



(a) $q_b + q_d + q_f = \frac{100}{9} C$

(b) $q_b + q_d + q_f = 0$

(c) $q_a + q_c + q_e = 50\ C$

(d) $q_b = q_d = q_f$

9. n identical condensers are joined in parallel and are charged to potential V. Now they are separated and joined in series. Then the total energy and potential difference of the combination will be **[MP PET 1993]**

(a) Energy and potential difference remain same

(b) Energy remains same and potential difference is nV

(c) Energy increases n times and potential difference is nV

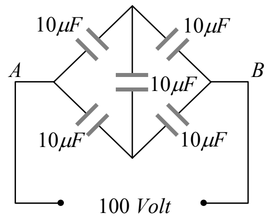
(d) Energy increases n times and potential difference remains same

10. Three capacitors each of capacitance $1\mu F$ are connected in parallel. To this combination, a fourth capacitor of capacitance $1\mu F$ is connected in series. The resultant capacitance of the system is **[MP PMT 1985]**

(a) $4\mu F$ (b) $2\mu F$

(c) $\frac{4}{3}\mu F$ (d) $\frac{3}{4}\mu F$

11. Five capacitors of $10\mu F$ capacity each are connected to a *d.c.* potential of $100\ volts$ as shown in the adjoining figure. The equivalent capacitance between the points A and B will be equal to **[CPMT 1986, 88; MP PMT 1999]**



(a) $40\mu F$

(b) $20\mu F$

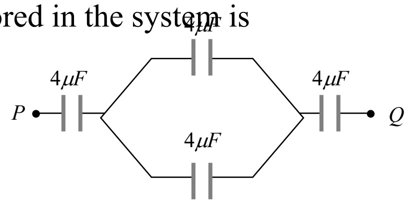
(c) $30\mu F$

(d) $10\mu F$

12. Three capacitors of capacitances $3\mu F, 9\mu F$ and $18\mu F$ are connected once in series and another time in parallel. The ratio of equivalent capacitance in the two cases $\left(\frac{C_s}{C_p}\right)$ will be

(a) 1 : 15 (b) 15 : 1
(c) 1 : 1 (d) 1 : 3

13. Four condensers each of capacity $4\mu F$ are connected as shown in figure. $V_P - V_Q = 15\,volts$. The energy stored in the system is

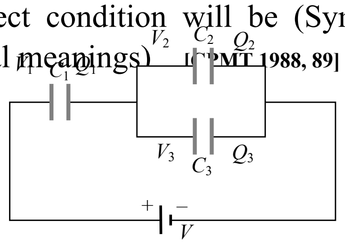


(a) 2400 *ergs*
(b) 1800 *ergs*
(c) 3600 *ergs*
(d) 5400 *ergs*

14. Two capacitors each of $1\mu F$ capacitance are connected in parallel and are then charged by 200 *volts d.c.* supply. The total energy of their charges (in joules) is **[MP PMT 1990, 2002]**

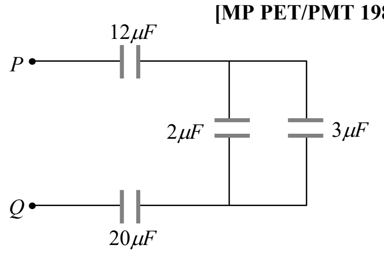
(a) 0.01 (b) 0.02
(c) 0.04 (d) 0.06

15. In an adjoining figure are shown three capacitors C_1, C_2 and C_3 joined to a battery. The correct condition will be (Symbols have their usual meanings) **[CPMT 1988, 89]**



(a) $Q_1 = Q_2 = Q_3$ and $V_1 = V_2 = V_3 = V$
(b) $Q_1 = Q_2 + Q_3$ and $V = V_1 + V_2 + V_3$
(c) $Q_1 = Q_2 + Q_3$ and $V = V_1 + V_2$
(d) $Q_2 = Q_3$ and $V_2 = V_3$

16. In the circuit diagram shown in the adjoining figure, the resultant capacitance between *P* and *Q* is **[MP PET/PMT 1988]**



(a) $47\mu F$
(b) $3\mu F$
(c) $60\mu F$
(d) $10\mu F$

17. Two condensers of capacity $0.3\mu F$ and $0.6\mu F$ respectively are connected in series. The combination is connected across a potential of 6 *volts*. The ratio of energies stored by the condensers will be **[CPMT 1990]** **[MP PMT 1990]**

(a) $\frac{1}{2}$ (b) 2
(c) $\frac{1}{4}$ (d) 4

[CPMT 1976, 89]

18. The capacitor of capacitance $4\mu F$ and $6\mu F$ are connected in series. A potential difference of 500 *volts* is applied to the outer plates of the two capacitor system. The potential difference across the plates of capacitor of $4\mu F$ capacitance is

(a) 500 *volts* (b) 300 *volts*
(c) 200 *volts* (d) 250 *volts*

19. Two capacitances of capacity C_1 and C_2 are connected in series and potential difference V is applied across it. Then the potential difference across C_1 will be **[MP PMT 1985]**

(a) $V\frac{C_2}{C_1}$ (b) $V\frac{C_1 + C_2}{C_1}$
(c) $V\frac{C_2}{C_1 + C_2}$ (d) $V\frac{C_1}{C_1 + C_2}$

20. Three capacitances of capacity $10\mu F, 5\mu F$ and $5\mu F$ are connected in parallel. The total capacity will be **[MP PET/PMT 1988]**

(a) $10\mu F$ (b) $5\mu F$
(c) $20\mu F$ (d) None of the above

21. Three capacitors of capacity $C_1, C_2\, C_3$ are connected in series. Their total capacity will be **[MP Board 1977; MP PET/PMT 1988; CPMT 1996]**

(a) $C_1 + C_2 + C_3$ (b) $1/(C_1 + C_2 + C_3)$
(c) $(C_1^{-1} + C_2^{-1} + C_3^{-1})^{-1}$ (d) None of these

22. Two capacitors of equal capacity are first connected in parallel and then in series. The ratio of the total capacities in the two cases will be **[MP Board 1988; MH CET 2001]**

(a) 2 : 1 (b) 1 : 2
(c) 4 : 1 (d) 1 : 4

23. Two capacitors connected in parallel having the capacities C_1 and C_2 are given 'q' charge, which is distributed among them. The ratio of the charge on C_1 and C_2 will be

[NCERT 1977; MP PET/PMT 1988]

(a) $\frac{C_1}{C_2}$ (b) $\frac{C_2}{C_1}$

(c) C_1C_2 (d) $\frac{1}{C_1C_2}$

24. Two capacitors of capacities C_1 and C_2 are charged to voltages V_1 and V_2 respectively. There will be no exchange of energy in connecting them in parallel, if [MP PET 1989]

(a) $C_1 = C_2$ (b) $C_1V_1 = C_2V_2$

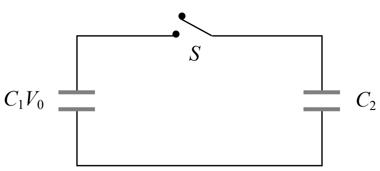
(c) $V_1 = V_2$ (d) $\frac{C_1}{V_1} = \frac{C_2}{V_2}$

25. If three capacitors each of capacity $1\mu F$ are connected in such a way that the resultant capacity is $1.5\mu F$, then

[MP PET 1989]

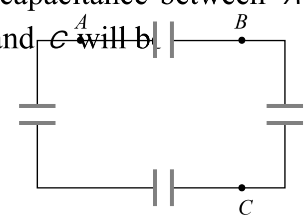
(a) All the three are connected in series
(b) All the three are connected in parallel
(c) Two of them are in parallel and connected in series to the third
(d) Two of them are in series and then connected in parallel to the third

26. A capacitor of capacity C_1 is charged to the potential of V_0. On disconnecting with the battery, it is connected with a capacitor of capacity C_2 as shown in the adjoining figure. The ratio of energies before and after the connection of switch S will be



(a) $(C_1 + C_2)/C_1$
(b) $C_1/(C_1 + C_2)$
(c) C_1C_2
(d) C_1/C_2

27. Four capacitors of each of capacity $3\mu F$ are connected as shown in the adjoining figure. The ratio of equivalent capacitance between A and B and between A and C will be



(a) 4 : 3
(b) 3 : 4
(c) 2 : 3
(d) 3 : 2

28. The capacities of two conductors are C_1 and C_2 and their respective potentials are V_1 and V_2. If they are connected by a thin wire, then the loss of energy will be given by

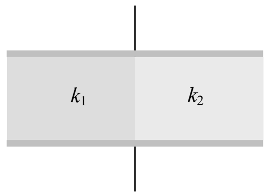
[MP PMT 1986]

(a) $\frac{C_1C_2(V_1 + V_2)}{2(C_1 + C_2)}$ (b) $\frac{C_1C_2(V_1 - V_2)}{2(C_1 + C_2)}$

(c) $\frac{C_1C_2(V_1 - V_2)^2}{2(C_1 + C_2)}$ (d) $\frac{(C_1 + C_2)(V_1 - V_2)}{C_1C_2}$

29. A parallel plate condenser is filled with two dielectrics as shown. Area of each plate is $A\ metre^2$ and the separation is $t\ metre$. The dielectric constants are k_1 and k_2 respectively. Its capacitance in farad will be

[MNR 1985; DCE 1999; AIIMS 2001]



(a) $\frac{\varepsilon_0 A}{t}(k_1 + k_2)$

(b) $\frac{\varepsilon_0 A}{t}.\frac{k_1 + k_2}{2}$

(c) $\frac{2\varepsilon_0 A}{t}(k_1 + k_2)$

(d) $\frac{\varepsilon_0 A}{t}.\frac{k_1 - k_2}{2}$

30. Three condensers each of capacitance $2F$ are put in series. The resultant capacitance is

[CPMT 1976; NCERT 1981; MP PMT 2001]

(a) $6F$ (b) $\frac{3}{2}F$

(c) $\frac{2}{3}F$ (d) $5F$

31. Two condensers of capacities $1\mu F$ and $2\mu F$ are connected in series and the system is charged to $120\ volts$. Then the P.D. on $1\mu F$ capacitor (in volts) will be [MP PMT 1987]

(a) 40 (b) 60

(c) 80 (d) 120

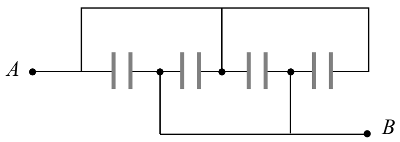
32. Four condensers are joined as shown in the adjoining figure. The capacity of each is $8\mu F$. The equivalent capacity between the points A and B will be

(a) $32\mu F$

(b) $2\mu F$

(c) $8\mu F$

(d) $16\mu F$



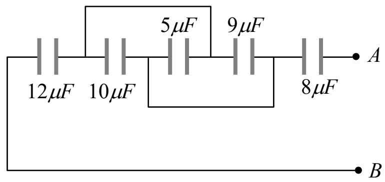
33. The capacities and connection of five capacitors are shown in the adjoining figure. The potential difference between the points A and B is $60\ volts$. Then the equivalent capacity between A and B and the charge on $5\mu F$ capacitance will be respectively

(a) $44\mu F; 300\mu C$

(b) $16\mu F; 150\mu C$

(c) $15\mu F; 200\mu C$

(d) $4\mu F; 50\mu C$



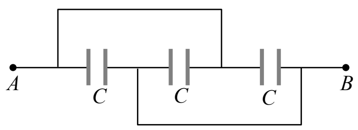
34. Three equal capacitors, each with capacitance C are connected as shown in figure. Then the equivalent capacitance between A and B is **[MP PET 1985, 89]**

(a) C

(b) $3C$

(c) $\frac{C}{3}$

(d) $\frac{3C}{2}$



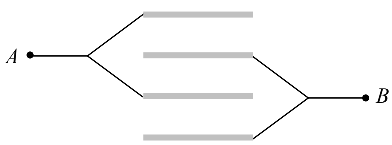
35. Four plates of the same area of cross-section are joined as shown in the figure. The distance between each plate is d. The equivalent capacity across *A* and *B* will be

(a) $\frac{2\varepsilon_0 A}{d}$

(b) $\frac{3\varepsilon_0 A}{d}$

(c) $\frac{3\varepsilon_0 A}{2d}$

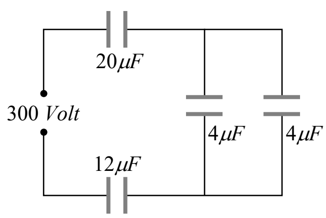
(d) $\frac{\varepsilon_0 A}{d}$



36. In the adjoining figure, four capacitors are shown with their respective capacities and the P.D. applied. The charge and the P.D. across the $4\mu F$ capacitor will be

(a) $600\mu C$; 150 *volts*

(b) $300\mu C$; 75 *volts*



(c) $800\mu C$; 200 *volts*

(d) $580\mu C$; 145 *volts*

37. Three identical capacitors are combined differently. For the same voltage to each combination, the one that stores the greatest energy is **[MP PMT 1995]**

(a) Two in parallel and the third in series with it

(b) Three in series

(c) Three in parallel

(d) Two in series and third in parallel with it

38. Two capacitors each of capacity $2\mu F$ are connected in parallel. This system is connected in series with a third capacitor of $12\mu F$ capacity. The equivalent capacity of the system will be **[MP PET 19**

(a) $16\mu F$ (b) $13\mu F$

(c) $4\mu F$ (d) $3\mu F$

39. A $4\mu F$ condenser is connected in parallel to another condenser of $8\mu F$. Both the condensers are then connected in series with a $12\mu F$ condenser and charged to $20\ volts$. The charge on the plate of $4\mu F$ condenser is

[MP PET 1989]

(a) $3.3\mu C$ (b) $40\mu C$

(c) $80\mu C$ (d) $240\mu C$

40. A capacitor having capacitance C is charged to a voltage V. It is then removed and connected in parallel with another identical capacitor which is uncharged. The new charge on each capacitor is now **[MP PET 1990]**

(a) CV (b) $CV/2$

(c) $2\ CV$ (d) $CV/4$

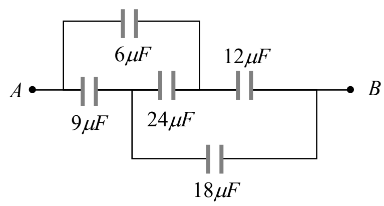
41. In the connections shown in the adjoining figure, the equivalent capacity between A and B will be

(a) $10.8\mu F$

(b) $69\mu F$

(c) $15\mu F$

(d) $10\mu F$



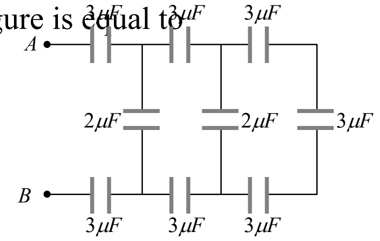
42. $2\mu F$ capacitance has potential difference across its two terminals $200\ volts$. It is disconnected with battery and then another uncharged capacitance is connected in parallel to it, then

P.D. becomes $20\ volts$. Then the capacity of another capacitance will be **[CPMT 1991; DPMT 2001]**

(a) $2\mu F$ (b) $4\mu F$

(c) $18\mu F$ (d) $10\mu F$

43. The resultant capacitance between A and B in the following figure is equal to



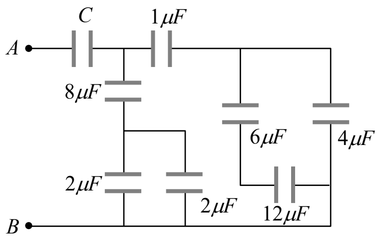
(a) $1\mu F$

(b) $3\mu F$

(c) $2\mu F$

(d) $1.5\mu fF$

44. In the following circuit, the resultant capacitance between A and B is $1\mu F$. Then value of C is **[IIT 1977]**



(a) $\frac{32}{11}\mu F$

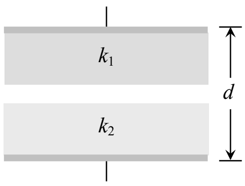
(b) $\frac{11}{32}\mu F$

(c) $\frac{23}{32}\mu F$

(d) $\frac{32}{23}\mu F$

45. Two dielectric slabs of constant K_1 and K_2 have been filled in between the plates of a capacitor as shown below. What will be the capacitance of the capacitor

[MNR 1985; MP PET 1999; DCE 2002]



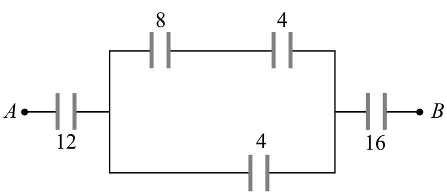
(a) $\frac{2\varepsilon_0 A}{2}(K_1 + K_2)$

(b) $\frac{2\varepsilon_0 A}{2}\left(\frac{K_1 + K_2}{K_1 \times K_2}\right)$

(c) $\frac{2\varepsilon_0 A}{2}\left(\frac{K_1 \times K_2}{K_1 + K_2}\right)$

(d) $\frac{2\varepsilon_0 A}{d}\left(\frac{K_1 \times K_2}{K_1 + K_2}\right)$

46. What is the equivalent capacitance between A and B in the given figure (all are in farad)



(a) $\frac{13}{18}F$

(b) $\frac{48}{13}F$

(c) $\frac{1}{31}F$

(d) $\frac{240}{71}F$

47. A condenser having a capacity of $6\mu F$ is charged to 100 V and is then joined to an uncharged condenser of $14\mu F$ and then removed. The ratio of the charges on $6\mu F$ and $14\mu F$ and the potential of $6\mu F$ will be

(a) $\frac{6}{14}$ and $50\ volt$ (b) $\frac{14}{6}$ and $30\ volt$

(c) $\frac{6}{14}$ and $30\ volt$ (d) $\frac{14}{6}$ and $0\ volt$

48. $0.2F$ capacitor is charged to $600\ V$ by a battery. On removing the battery, it is connected with another parallel plate condenser of $1F$. The potential decreases to

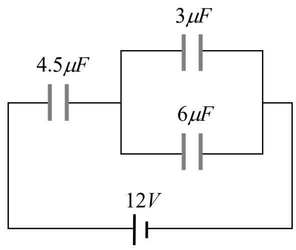
[MNR 1978; MP PET 2002]

(a) $100\ volts$ (b) $120\ volts$

(c) $300\ volts$ (d) $600\ volts$

49. In the circuit shown in the figure, the potential difference across the $4.5\mu F$ capacitor is

[MP PET 1992; RPET 2001; BVP 2003]



(a) $\frac{8}{3}\ volts$

(b) 4 $volts$

(c) 6 $volts$

(d) 8 $volts$

50. Minimum number of capacitors of $2\mu F$ capacitance each required to obtain a capacitor of $5\mu F$ will be **[MP PET 1992]**

(a) Three (b) Four

(c) Five (d) Six

51. A condenser of capacitance $10\mu F$ has been charged to $100\ volts$. It is now connected to another uncharged condenser in parallel. The common potential becomes $40\ volts$. The capacitance of another condenser is [IIT 1997]

[MP PET 1992]

(a) $15\mu F$ (b) $5\mu F$

(c) $10\mu F$ (d) $16.6\mu F$

52. A capacitor $4\mu F$ charged to 50 V is connected to another capacitor of $2\mu F$ charged to 100 V with plates of like charges connected together. The total energy before and after connection in multiples of $(10^{-2} J)$ is **[MP PMT 1992]**

(a) 1.5 and 1.33 (b) 1.33 and 1.5

(c) 3.0 and 2.67 (d) 2.67 and 3.0

53. Two capacitors of 3*pF* and 6*pF* are connected in series and a potential difference of 5000 V is applied across the combination. They are then disconnected and reconnected in parallel. The potential between the plates is **[MP PMT 1992]**

(a) 2250 V (b) 2222 V

(c) $2.25 \times 10^6 V$ (d) $1.1 \times 10^6 V$

54. Two identical parallel plate capacitors are connected in series to a battery of 100 V. A dielectric slab of dielectric constant 4.0 is inserted between the plates of second capacitor. The potential difference across the capacitors will now be respectively

(a) 50 *V*, 50 *V* (b) 80 V, 20 *V*

(c) 20 *V*, 80 *V* (d) 75 *V*, 25 *V*

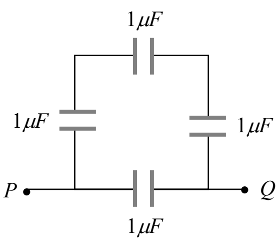
55. Four capacitors are connected as shown in the equivalent capacitance between the points *P* and *Q* is **[MP PET 1983; MP PMT 1992; UPSEAT 1999]**

(a) $4\mu F$

(b) $\frac{1}{4}\mu F$

(c) $\frac{3}{4}\mu F$

(d) $\frac{4}{3}\mu F$



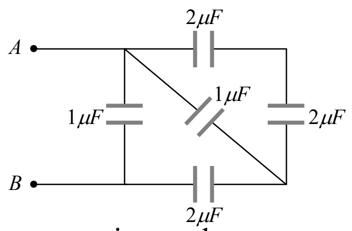
56. The total capacity of the system of capacitors shown in the adjoining figure between the points A and B is **[Pantnagar 1987; SCRA 1996; MP PMT 2002]**

(a) $1\mu F$

(b) $2\mu F$

(c) $3\mu F$

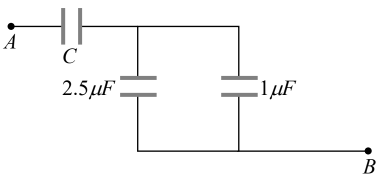
(d) $4\mu F$



57. The equivalent capacitance between A and B in the figure is $1\mu F$. Then the value of capacitance C is **[MP PET 1994]**

(a) $1.4\mu F$

(b) $2.5\mu F$



(c) $3.5\mu F$

(d) $1.2\mu F$

58. A condenser of capacity C_1 is charged to a potential V_0. The electrostatic energy stored in it is U_0. It is connected to another uncharged condenser of capacity C_2 in parallel. The energy dissipated in the process is **[MP PMT 1994]**

(a) $\frac{C_2}{C_1 + C_2} U_0$ (b) $\frac{C_1}{C_1 + C_2} U_0$

(c) $\left(\frac{C_1 - C_2}{C_1 + C_2}\right) U_0$ (d) $\frac{C_1 C_2}{2(C_1 + C_2)} U_0$

59. Three capacitors each of $6\mu F$ are available. The minimum and maximum capacitances which may be obtained are **[MP PMT 1994]**

(a) $6\mu F, 18\mu F$ (b) $3\mu F, 12\mu F$

(c) $2\mu F, 12\mu F$ (d) $2\mu F, 18\mu F$

[MP PMT 1992]

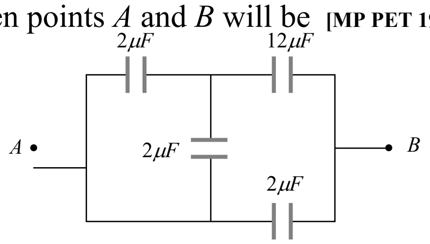
60. Four capacitors are connected in a circuit as shown in the figure. The effective capacitance in μF between points *A* and *B* will be **[MP PET 1996; Pb. PM**

(a) $\frac{28}{9}$

(b) 4

(c) 5

(d) 18



61. 100 capacitors each having a capacity of $10\mu F$ are connected in parallel and are charged by a potential difference of $100 kV$. The energy stored in the capacitors and the cost of charging them, if electrical energy costs 108 *paise per kWh*, will be **[MP PET 1996; DPMT 2001]**

(a) 10^7 *joule* and 300 *paise*

(b) 5×10^6 *joule* and 300 *paise*

(c) 5×10^6 *joule* and 150 *paise*

(d) 10^7 *joule* and 150 *paise*

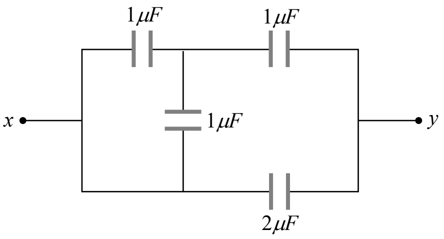
62. Three capacitors of 2.0, 3.0 and 6.0 μF are connected in series to a 10 V source. The charge on the $3.0\mu F$ capacitor is

(a) $5\mu C$ (b) $10\mu C$

(c) $12\mu C$ (d) $15\mu C$

63. Four capacitors are connected as shown in the figure. Their capacities are indicated in the figure. The effective capacitance between points x and y is (in μF)

[RPET 1997]



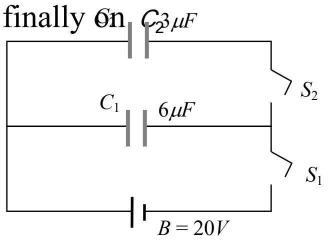
(a) $\frac{5}{6}$

(b) $\frac{7}{6}$

(c) $\frac{8}{3}$

(d) 2

64. In the circuit shown here $C_1 = 6\mu F$, $C_2 = 3\mu F$ and battery $B = 20 V$. The switch S_1 is first closed. It is then opened and afterwards S_2 is closed. What is the charge finally on C_2



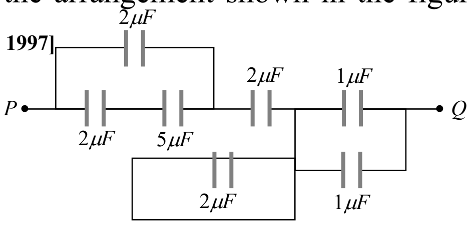
(a) $120\mu C$

(b) $80\mu C$

(c) $40\mu C$

(d) $20\mu C$

65. The effective capacitance between the points P and Q of the arrangement shown in the figure is **[MP PET 1997]**



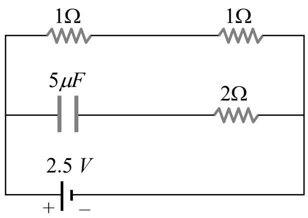
(a) $\frac{1}{2}\mu F$

(b) $1\mu F$

(c) $2\mu F$

(d) $1.33\mu F$

66. A capacitor of capacitance $5\mu F$ is connected as shown in the figure. The internal resistance of the cell is 0.5Ω. The amount of charge on the capacitor plate is **[MP PET 1997]**



(a) $0\mu C$

(b) $5\mu C$

(c) $10\mu C$

(d) $25\mu C$

67. Choose the incorrect statement from the following: When two identical capacitors are charged individually to different potentials and connected parallel to each other after disconnecting them from the source **[MP PET 1997]**

(a) Net charge equals the sum of initial charges

(b) The net energy stored in the two capacitors is less than the sum of the initial individual energies

(c) The net potential difference across them is different from the sum of the individual initial potential difference

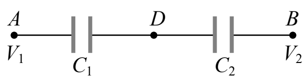
(d) The net potential difference across them equals the sum of the individual initial potential differences

68. A $10\mu F$ capacitor and a $20\mu F$ capacitor are connected in series across a $200 V$ supply line. The charged capacitors are then disconnected from the line and reconnected with their positive plates together and negative plates together and no external voltage is applied. What is the potential difference across each capacitor **[MP PET 1997]**

(a) $\frac{400}{9} V$ (b) $\frac{800}{9} V$

(c) $400 V$ (d) $200 V$

69. Two condensers C_1 and C_2 in a circuit are joined as shown in figure. The potential of point A is V_1 and that of B is V_2. The potential of point D will be **[MP PMT 1997]**



(a) $\frac{1}{2}(V_1 + V_2)$ (b) $\frac{C_2V_1 + C_1V_2}{C_1 + C_2}$

(c) $\frac{C_1V_1 + C_2V_2}{C_1 + C_2}$ (d) $\frac{C_2V_1 - C_1V_2}{C_1 + C_2}$

70. To obtain $3\mu F$ capacity from three capacitors of $2\mu F$ each, they will be arranged

(a) All the three in series

(b) All the three in parallel

(c) Two capacitors in series and the third in parallel with the combination of first two

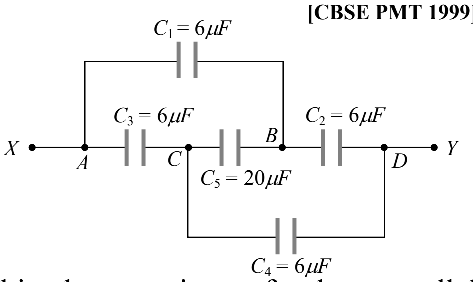
(d) Two capacitors in parallel and the third in series with the combination of first two

71. A $10\mu F$ capacitor is charged to a potential difference of $50\ V$ and is connected to another uncharged capacitor in parallel. Now the common potential difference becomes $20\ volt$. The capacitance of second capacitor is **[MP PET 1999; DPMT 2000]**

(a) $10\mu F$ (b) $20\mu F$

(c) $30\mu F$ (d) $15\mu F$

72. What is the effective capacitance between points X and Y **[CBSE PMT 1999]**



(a) $24\mu F$

(b) $18\mu F$

(c) $12\mu F$

(d) $6\mu F$

73. The combined capacity of the parallel combination of two capacitors is four times their combined capacity when connected in series. This means that **[EAMCET 1994]**

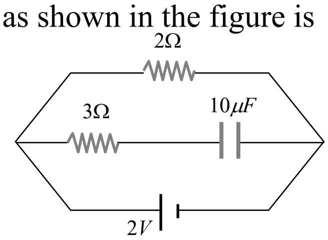
(a) Their capacities are equal

(b) Their capacities are $1\mu F$ and $2\mu F$

(c) Their capacities are $0.5\mu F$ and $1\mu F$

(d) Their capacities are infinite

74. The charge on a capacitor of capacitance $10\mu F$ connected as shown in the figure is



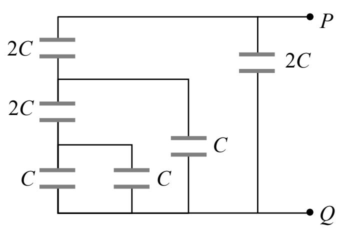
(a) $20\mu C$

(b) $15\mu C$

(c) $10\mu C$

(d) Zero

75. The resultant capacitance of given circuit is **[RPET 1997]**



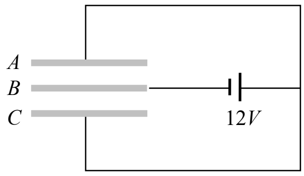
(a) $3C$

(b) $2C$

(c) C

(d) $\frac{C}{3}$

76. Three plates A, B, C each of area $50\ cm^2$ have separation $3\ mm$ between A and B and $3\ mm$ between B and C. The energy stored when the plates are fully charged is **[SCRA 1996]**



(a) $1.6\times10^{-9}\ J$

(b) $2.1\times10^{-9}\ J$

(c) $5\times10^{-9}\ J$

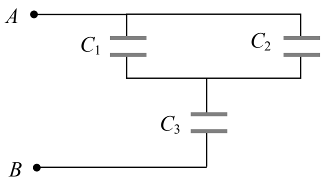
(d) $7\times10^{-9}\ J$

77. A capacitor of $20\mu F$ is charged to $500\ volts$ and connected in parallel with another capacitor of $10\mu F$ and charged to $200\ volts$. The common potential is **[BHU 1997; CBSE PMT 2000; MH CET 1999; BHU 2004]**

(a) $200\ volts$ (b) $300\ volts$

(c) $400\ volts$ (d) $500\ volts$

78. In the given network capacitance, $C_1 = 10\mu F, C_2 = 5\mu F$ and $C_3 = 4\mu F$. What is the resultant capacitance between A and B



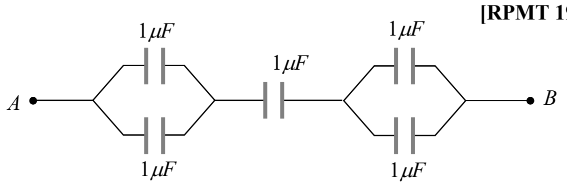
(a) 2.2 μF

(b) 3.2 μF

(c) 1.2 μF

(d) 4.7 μF

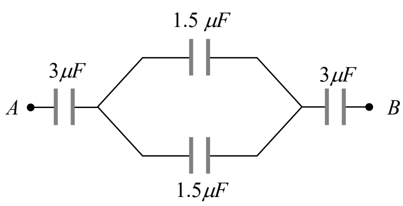
79. The equivalent capacitance between A and B is **[RPMT 1999]**



(a) 2 μF **[AMU 1995]** (b) 3 μF

(c) 5 μF (d) 0.5 μF

80. The capacitance between the points A and B in the given circuit will be **[AMU (Med.) 1999; MH CET 1999; Pb. PET 2002; BCECE 2005]**



(a) 1 μF

(b) 2 μF

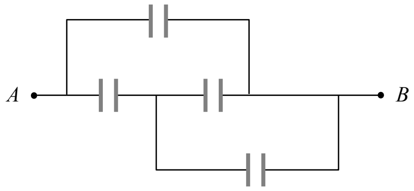
(c) 3 μF

(d) 4 μF

81. The equivalent capacitance of three capacitors of capacitance C_1, C_2 and C_3 are connected in parallel is 12 units and product $C_1.C_2.C_3 = 48$. When the capacitors C_1 and C_2 are connected in parallel, the equivalent capacitance is 6 units. Then the capacitance are **[KCET 1999]**

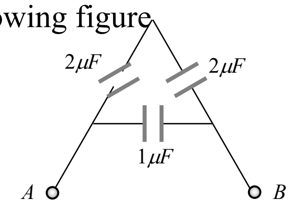
(a) 2, 3, 7 (b) 1.5, 2.5, 8
(c) 1, 5, 6 (d) 4, 2, 6

82. In the circuit shown in figure, each capacitor has a capacity of $3\mu F$. The equivalent capacity between A and B is **[MP PMT 2000]**



(a) $\frac{3}{4}\mu F$
(b) $3\mu F$
(c) $6\mu F$
(d) $5\mu F$

83. What is the effective capacitance between A and B in the following figure



(a) $1\mu F$
(b) $2\mu F$
(c) $1.5\mu F$
(d) $2.5\mu F$

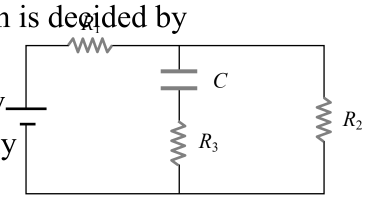
84. A potential difference of 300 *volts* is applied to a combination of $2.0\mu F$ and $8.0\mu F$ capacitors connected in series. The charge on the $2.0\mu F$ capacitor is **[MP PMT 2000]**

(a) $2.4\times10^{-4}\,C$ (b) $4.8\times10^{-4}\,C$
(c) $7.2\times10^{-4}\,C$ (d) $9.6\times10^{-4}\,C$

85. Ten capacitor are joined in parallel and charged with a battery up to a potential V. They are then disconnected from battery and joined again in series then the potential of this combination will be **[RPET 2000]**

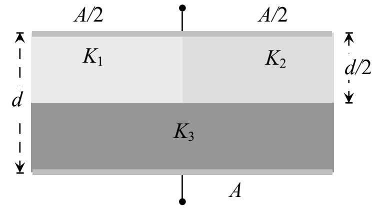
(a) V (b) $10V$
(c) $5V$ (d) $2V$

86. In the circuit here, the steady state voltage across capacitor C is a fraction of the battery e.m.f. The fraction is decided by



(a) R_1 only
(b) R_1 and R_2 only
(c) R_1 and R_3 only
(d) R_1, R_2 and R_3

87. A parallel plate capacitor of area A, plate separation d and capacitance C is filled with three different dielectric materials having dielectric constants k_1, k_2 and k_3 as shown. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constant k is given by

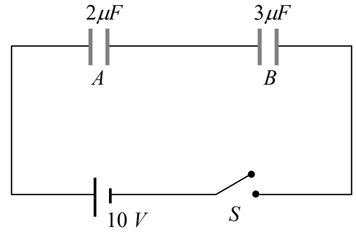


A = Area of plates

(a) $\frac{1}{k}=\frac{1}{k_1}+\frac{1}{k_2}+\frac{1}{2k_3}$ (b) $\frac{1}{k}=\frac{1}{k_1+k_2}+\frac{1}{2k_3}$

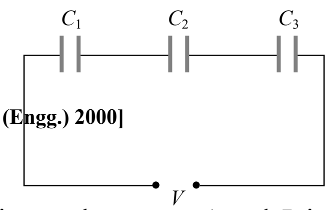
(c) $k=\frac{k_1k_2}{k_1+k_2}+2k_3$ (d) $k=k_1+k_2+2k_3$

88. Two capacitors A and B are connected in series with a battery as shown in the figure. When the switch S is closed and the two capacitors get charged fully, then **[AMU (Engg.) 2000]** **[MP PET 2000]**



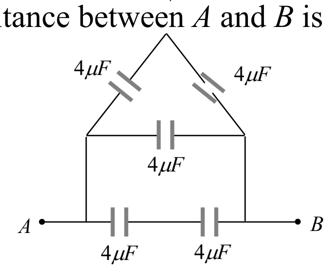
(a) The potential difference across the plates of A is $4V$ and across the plates of B is $6V$
(b) The potential difference across the plates of A is $6V$ and across the plates of B is $4V$
(c) The ratio of electrical energies stored in A and B is 2 : 3
(d) The ratio of charges on A and B is 3 : 2

89. In the figure, three capacitors each of capacitance 6 pF are connected in series. The total capacitance of the combination will be **[MH C**



(a) $9\times10^{-12}\,F$
(b) $6\times10^{-12}\,F$
(c) $3\times10^{-12}\,F$ **[AMU (Engg.) 2000]**
(d) $2\times10^{-12}\,F$

90. Equivalent capacitance between A and B is **[DCE 2001**



(a) $8\mu F$

(b) $6\mu F$

(c) $26\mu F$

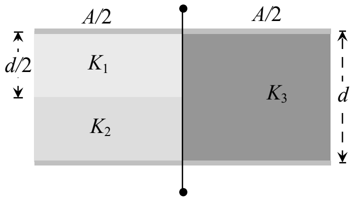
(d) $10/3\mu F$

91. Two capacitors of $10\mu F$ and $20\mu F$ are connected in series with a $30V$ battery. The charge on the capacitors will be, respectively

(a) $100\mu C, 200\mu C$ (b) $200\mu C, 100\mu C$

(c) $100\mu C, 100\mu C$ (d) $200\mu C, 200\mu C$

92. In the figure a capacitor is filled with dielectrics. The resultant capacitance is



(a) $\frac{2\varepsilon_0 A}{d}\left[\frac{1}{k_1}+\frac{1}{k_2}+\frac{1}{k_3}\right]$ (b) $\frac{\varepsilon_0 A}{d}\left[\frac{1}{k_1}+\frac{1}{k_2}+\frac{1}{k_3}\right]$

(c) $\frac{2\varepsilon_0 A}{d}[k_1+k_2+k_3]$ (d) None of these

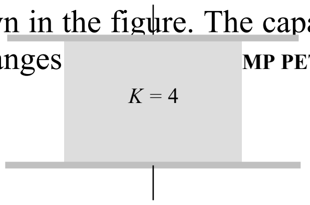
93. Three capacitors of capacitance $3\mu F, 10\mu F$ and $15\mu F$ are connected in series to a voltage source of $100V$. The charge on $15\mu F$ is

[Pb. PMT 1999; AIIMS 2000; CPMT 2001]

(a) $50\mu C$ (b) $100\mu C$

(c) $200\mu C$ (d) $280\mu C$

94. Consider a parallel plate capacitor of $10\mu F$ (*micro-farad*) with air filled in the gap between the plates. Now one half of the space between the plates is filled with a dielectric of dielectric constant 4, as shown in the figure. The capacity of the capacitor changes **[MP PET 2001]**



(a) $25\mu F$

(b) $20\mu F$

(c) $40\mu F$

(d) $5\mu F$

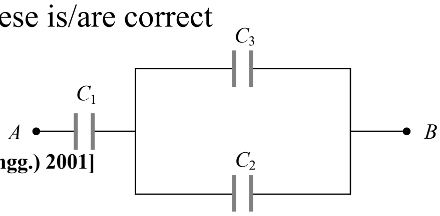
95. The combination of capacitors with $C_1 = 3\mu F, C_2 = 4\mu F$ and $C_3 = 2\mu F$ is charged by connecting AB to a battery. Consider the following statements

I. Energy stored in C_1 = Energy stored in C_2 + Energy stored in C_3

II. Charge on C_1 = Charge on C_2 + Charge on C_3

III. Potential drop across C_1 = Potential drop across C_2 = Potential drop across C_3

Which of these is/are correct



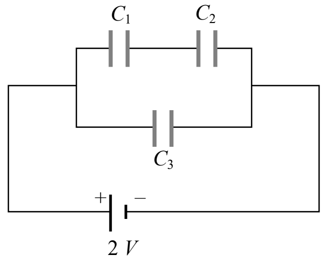
(a) I and II

(b) II only

(c) I and III **[AMU (Engg.) 2001]**

(d) III only

96. Two capacitors $C_1 = 2\mu F$ and $C_2 = 6\mu F$ in series, are connected in parallel to a third capacitor $C_3 = 4\mu F$. This arrangement is then connected to a battery of e.m.f. = $2V$, as shown in the figure. How much energy is lost by the battery in charging the capacitors **[UPSEAT 2004]**



(a) $22\times10^{-6}\,J$

(b) $11\times10^{-6}\,J$

(c) $\left(\frac{32}{3}\right)\times10^{-6}\,J$

(d) $\left(\frac{16}{3}\right)\times10^{-6}\,J$

97. A $20F$ capacitor is charged to $5V$ and isolated. It is then connected in parallel with an uncharged $30F$ capacitor. The decrease in the energy of the system will be **[EAMCET 2001]**

(a) $25\,J$ (b) $200\,J$

(c) $125\,J$ (d) $150\,J$

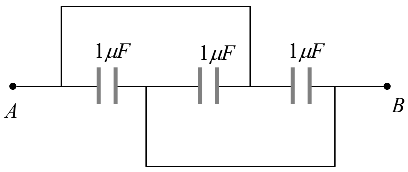
98. A parallel plate capacitor has capacitance C. If it is equally filled with parallel layers of materials of dielectric constants K_1 and K_2 its capacity becomes C_1. The ratio of C_1 to C is

[MP PMT 2001]

(a) $K_1 + K_2$ (b) $\frac{K_1K_2}{K_1-K_2}$

(c) $\frac{K_1+K_2}{K_1K_2}$ (d) $\frac{2K_1K_2}{K_1+K_2}$

99. The equivalent capacitance in the circuit between A and B will be



(a) $1\mu F$

(b) $2\mu F$

(c) $3\mu F$

(d) $\frac{1}{3}\mu F$

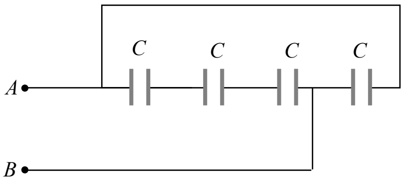
100. The equivalent capacitance between *A* and *B* is **[Pb. PMT 2002]**

(a) $\frac{C}{4}$

(b) $\frac{3C}{4}$

(c) $\frac{C}{3}$

(d) $\frac{4C}{3}$



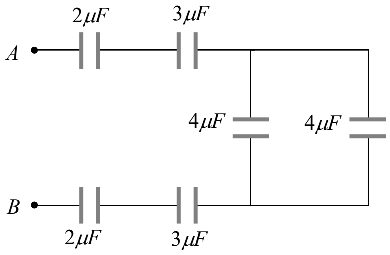
101. The effective capacity between *A* and *B* in the figure given is **[Kerala PMT 2002]**

(a) $\frac{43}{24}\mu F$

(b) $\frac{24}{43}\mu F$

(c) $\frac{43}{12}\mu F$

(d) $\frac{12}{43}\mu F$



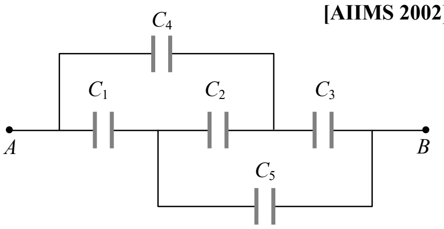
102. In the given figure the capacitors C_1, C_3, C_4, C_5 have a capacitance $4\mu F$ each if the capacitor C_2 has a capacitance $10\mu F$, then effective capacitance between *A* and *B* will be **[AIIMS 2002]**

(a) $2\mu F$

(b) $4\mu F$

(c) $6\mu F$

(d) $8\mu F$



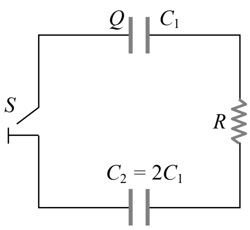
103. Two capacitors C_1 and $C_2 = 2C_1$ are connected in a circuit with a switch between them as shown in the figure. Initially the switch is open and C_1 holds charge *Q*. The switch is closed. At steady state, the charge on each capacitor will be **[Orissa JEE 2002]**

(a) $Q, 2Q$

(b) $Q/3, 2Q/3$

(c) $3Q/2, 3Q$

(d) $2Q/3, 4Q/3$



104. Three capacitors of $2\mu F, 3\mu F$ and $6\mu F$ are joined in series and the combination is charged by means of a 24 *volt* battery. The potential difference between the plates of the $6\mu F$ capacitor is **[MP PMT 2002]**

(a) 4 *volt* (b) 6 *volt*

(c) 8 *volt* (d) 10 *volt*

105. Two capacitors of capacitances $3\mu F$ and $6\mu F$ are charged to a potential of 12 *V* each. They are now connected to each other, with the positive plate of each joined to the negative plate of the other. The potential difference across each will be

(a) 6 *volt* (b) 4 *volt*

(c) 3 *volt* (d) Zero

106. Two identical capacitors, have the same capacitance *C*. One of them is charged to potential V_1 and the other to V_2. The negative ends of the capacitors are connected together. When the positive ends are also connected, the decrease in energy of the combined system is

(a) $\frac{1}{4}C(V_1^2 - V_2^2)$ (b) $\frac{1}{4}C(V_1^2 + V_2^2)$

(c) $\frac{1}{4}C(V_1 - V_2)^2$ (d) $\frac{1}{4}C(V_1 + V_2)^2$

107. A capacitor of $10\mu F$ charged up to 250 *volts* is connected in parallel with another capacitor of $5\mu F$ charged up to 100 *volts*. The common potential is **[BHU 2002]**

(a) 500 *V* (b) 400 *V*

(c) 300 *V* (d) 200 *V*

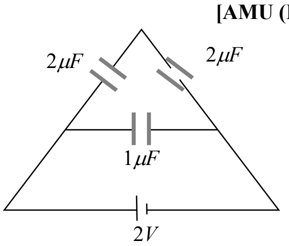
108. Two capacitors of $1\mu F$ and $2\mu F$ are connected in series, the resultant capacitance will be

(a) $4\mu F$ (b) $\frac{2}{3}\mu F$

(c) $\frac{3}{2}\mu F$ (d) $3\mu F$

109. The charge on any one of the $2\mu F$ capacitors and $1\mu F$ capacitor will be given respectively (in μC) as

[AMU (Med.) 2002]

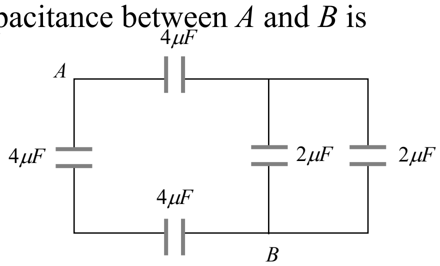


(a) 1, 2
(b) 2, 1
(c) 1, 1
(d) 2, 2

110. When two identical capacitors are in series have $3\mu F$ capacitance and when parallel $12\mu F$. What is the capacitance of each

(a) $6\mu F$ (b) $3\mu F$
(c) $12\mu F$ (d) $9\mu F$

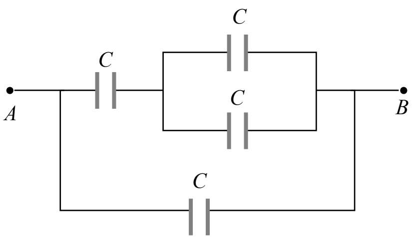
111. In the circuit as shown in the figure the effective capacitance between *A* and *B* is



(a) $3\mu F$
(b) $2\mu F$
(c) $4\mu F$
(d) $8\mu F$

112. Four equal capacitors, each of capacity *C*, are arranged as shown. The effective capacitance between *A* and *B* is

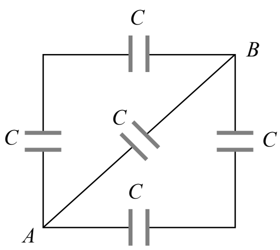
[MP PET 2003]



(a) $\frac{5}{8}C$
(b) $\frac{3}{5}C$
(c) $\frac{5}{3}C$
(d) *C*

113. In the figure shown, the effective capacitance between the points *A* and *B*, if each has capacitance *C*, is

[MP PET 2003]



(a) 2*C*
(b) $\frac{C}{5}$
(c) 5*C*
(d) $\frac{C}{2}$

114. Three capacitors each of capacity $4\mu F$ are to be connected in such a way that the effective capacitance is $6\mu F$. This can be done by

(a) Connecting them in parallel
(b) Connecting two in series and one in parallel
(c) Connecting two in parallel and one in series
(d) Connecting all of them in series

[DPMT 2002]

115. Three capacitors of capacitance $3\mu F$ are connected in a circuit. Then their maximum and minimum capacitances will be

(a) $9\mu F, 1\mu F$ (b) $8\mu F, 2\mu F$
(c) $9\mu F, 0\mu F$ (d) $3\mu F, 2\mu F$

[KCET 2003]

116. A capacitor of capacity C_1 is charged upto *V* volt and then connected to an uncharged capacitor of capacity C_2. Then final potential difference across each will be

[MP PET 2000; CBSE PMT 2002; MP PET 2003]

(a) $\frac{C_2 V}{C_1 + C_2}$ (b) $\left(1+\frac{C_2}{C_1}\right)V$
(c) $\frac{C_1 V}{C_1 + C_2}$ (d) $\left(1-\frac{C_2}{C_1}\right)V$

117. A series combination of three capacitors of capacities $1\mu F, 2\mu F$ and $8\mu F$ is connected to a battery of e.m.f. 13 *volt*. The potential difference across the plates of $2\mu F$ capacitor will be **[MP PET 2003]**

(a) $1V$ (b) $8V$
(c) $4V$ (d) $\frac{13}{3}V$

118. Two capacitors of capacitance $2\mu F$ and $3\mu F$ are joined in series. Outer plate first capacitor is at 1000 *volt* and outer plate of second capacitor is earthed (grounded). Now the potential on inner plate of each capacitor will be

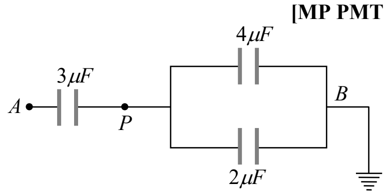
[MP PMT 2003]

(a) 700 *Volt* (b) 200 *Volt*
(c) 600 *Volt* (d) 400 *Volt*

119. In the figure a potential of + 1200 V is given to point A and point B is earthed, what is the potential at the point P

[MP PMT 2004]

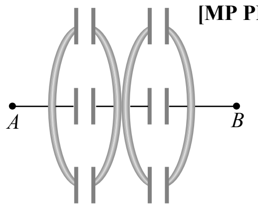
(a) 100 V
(b) 200 V
(c) 400 V
(d) 600 V



120. All six capacitors shown are identical, Each can withstand maximum 200 *volts* between its terminals. The maximum voltage that can be safely applied between A and B is

[MP PMT 2004]

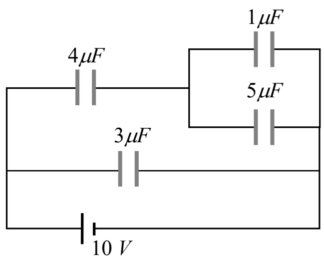
(a) 1200 V
(b) 400 V
(c) 800 V
(d) 200 V



121. The charge on 4 μF capacitor in the given circuit is .... in μC

[Kerala PMT 2004]

(a) 12
(b) 24
(c) 36
(d) 32



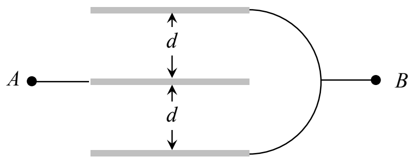
122. Three plates of common surface area A are connected as shown. The effective capacitance will be **[Orissa PMT 2004]**

(a) $\frac{\varepsilon_0 A}{d}$

(b) $\frac{3\varepsilon_0 A}{d}$

(c) $\frac{3}{2}\frac{\varepsilon_0 A}{d}$

(d) $\frac{2\varepsilon_0 A}{d}$



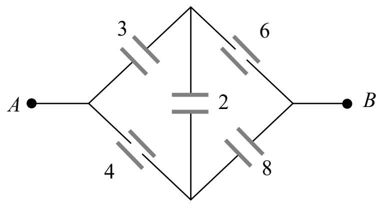
123. Three capacitors 2, 3 and 6 μF are joined in series with each other. What is the minimum effective capacitance

[Orissa PMT 2004]

(a) $\frac{1}{2}\mu F$ (b) 1 μF
(c) 2 μF (d) 3 μF

124. Effective capacitance between A and B in the figure shown is (all capacitance are in μF)

(a) 21 μF
(b) 23 μF
(c) $\frac{3}{14}\mu F$
(d) $\frac{14}{3}\mu F$

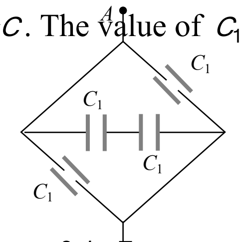


125. Three capacitors of capacitance 1 μF, 2 μF and 3 μF are connected in series and a potential difference of 11 V is applied across the combination. Then, the potential difference across the plates of 1 μF capacitor is **[DCE 2003]**

(a) 2 V (b) 4 V
(c) 1 V (d) 6 V

126. Four identical capacitors are connected as shown in diagram. When a battery of 6 V is connected between A and B, the charge stored is found to be 1.5 μC. The value of C_1 is

(a) 2.5μF
(b) 15μF
(c) 1.5μF
(d) 0.1μF



127. A 10 μF capacitor is charged to a potential difference of 1000 V. The terminals of the charged capacitor are disconnected from the power supply and connected to the terminals of an uncharged 6μF capacitor. What is the final potential difference across each capacitor **[Kerala PMT 200**

(a) 167 V (b) 100 V
(c) 625 V (d) 250 V