PHYSICS

AAKASH INSTITUTE ENGLISH

Mock test 26

Example

1. The equivalent capacitance between the points A and B in given circuit is 

A. $1\mu F$

B. $2\mu F$

C. $3\mu F$

D. $4\mu F$

Answer: A

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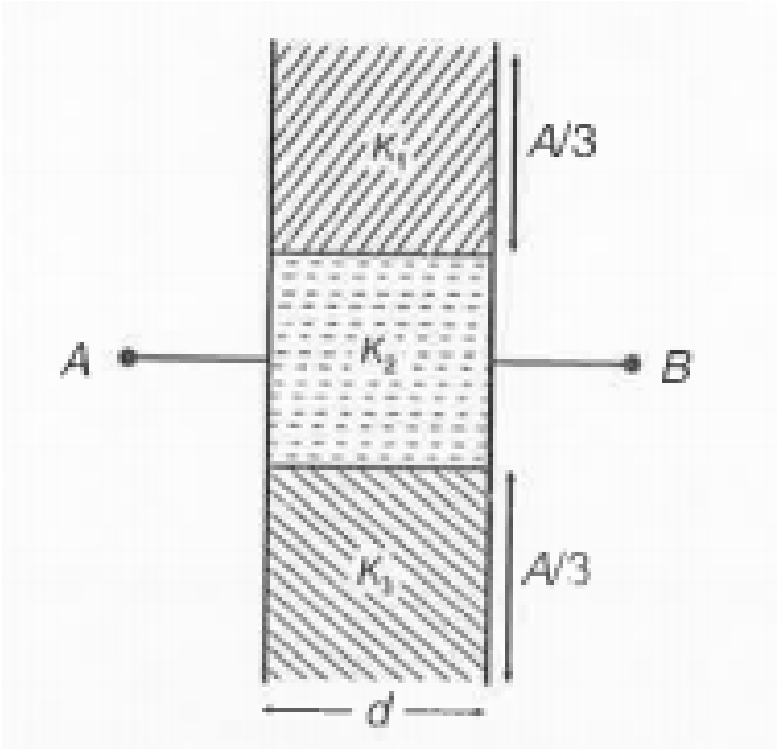
2. A parallel plate capacitor of plate area A and separation d filled with three dielectric materials as show in figure. The dielectric

constants are K_1, K_2 and K_3 respectively. The capacitance across AB will be :



A. $\frac{\varepsilon_\circ A}{d}\left(\frac{K_1K_2K_3}{K_1+K_2+K_3}\right)$

B. $\frac{\varepsilon_\circ A}{d}(K_1+K_2+K_3)$

C. $\frac{\varepsilon_\circ A}{3d}(K_1+K_2+K_3)$

D. $\frac{3\varepsilon_{\circ} A}{2d}(K_1 + K_2 + K_3)$

Answer: C

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3. Six equal capacitors each of capacitance $10\mu F$ are connect as shown in the figure. Then the equivalent capacitance between A and B is

A. $20\mu F$

B. $30\mu F$

C. $15\mu F$

D. $10\mu F$

Answer: A

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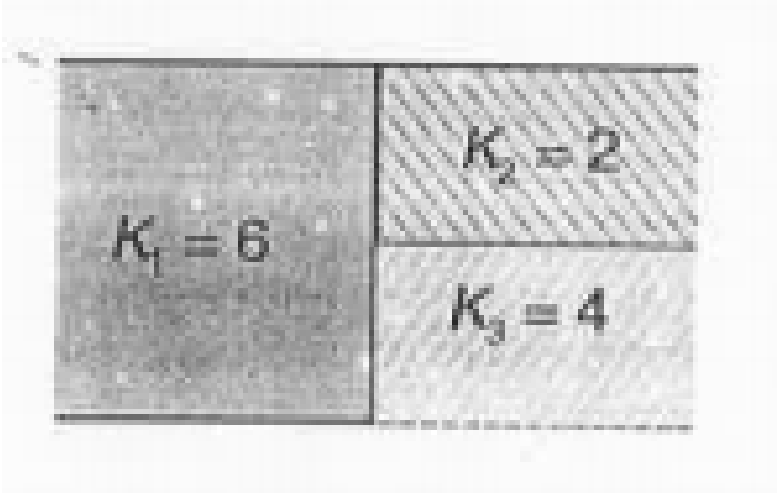
4. A parallel plate capacitor of capacitance C (without dielectric) is filled by dielectric slabs as shown in figure. Then the new capacitance

of the capacitor is



A. 5 C

B. $\frac{13}{3}C$

C. $\frac{3}{13}C$

D. 2.4 C

Answer: B

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5. The energy required to charge a parallel plate condenser of plate separation d and plate area of cross-section A such that the uniform electric field between the plates E, is

A. $\frac{\frac{1}{2}\varepsilon_{\circ}E^2}{Ad}$

B. $\frac{1}{2}\varepsilon_{\circ}E^2Ad$

C. $\varepsilon_{\circ}E^2Ad$

D. $\frac{\varepsilon_{\circ}E^2}{Ad}$

Answer: C

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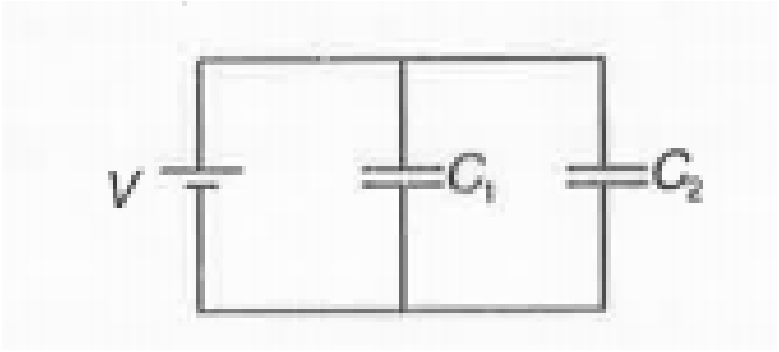
6. Two capacitors C_1 and C_2 of capacitances $\frac{C}{2}$ and $\frac{C}{4}$ are connected to a V volt battery, as shown in figure. The ratio of energy slored in capacitors C_1 and C_2 is



A. 1 :1`

B. 1 : 2 `

C. 2 : 1 `

D. 2 : 3`

Answer: C

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7. A capacitor of capacitance $15\mu F$ has a charge $30\mu C$ and stored energy is W. If charge increased to $60\mu C$ the energy stored will be.

A. W

B. 4W

C. 6W

D. 1/2 W`

Answer: B

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8. Six identical capacitors are connected as shown in figure. Capacitance of each

capacitors is $5\mu F$ The effective capacitance between point A and B is 

A. $7.5\mu F$

B. $10\mu F$

C. $5\mu F$

D. $1.5\mu F$

Answer: A

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9. The charge supplied by the battery in the circuit shown in the figure 

A. $\frac{300}{11}\mu C$

B. $60\mu C$

C. $50\mu C$

D. $110\mu C$

Answer: D

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10. The energy stored in $4\mu F$ capacitors is 

A. $8\mu J$

B. $12\mu J$

C. $16\mu J$

D. $20\mu J$

Answer: A

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11. Two identical parallel plate air capacitors are connected in series to a battery of emf V. If one of the capacitor is completely filled with dielectric material of constant K, then potential difference of the other capacitor will become

A. $110\mu J$

B. $112\mu J$

C. $114.5\mu J$

D. $115.2\mu J$

Answer: D

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12. Six identical capacitors each of capacitance $2\mu F$ are connected as shown below. The equivalent capacitance between the points A and B is 

A. $\frac{3}{8}\mu F$

B. $3\mu F$

C. $\frac{8}{3}\mu F$

D. $8\mu F$

Answer: C

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13. Van de Graaff generator is

A. The phenomenon of corona discharge

B. The property of hollow conductor is transferred to outer surface

C. Fact that conductor can conduct heat and electricity

D. Both (1) and (2)

Answer: D

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14. Two capacitors $C_1 = C$ and $C_2 = 3C$ are connected as shown in figure, Initially, key K is open and capacitor C_1 holds charge Q. After

closing the key K, the charge on each capacitor at steady state will be 

A. $\frac{Q}{4}, \frac{Q}{4}$

B. $\frac{Q}{4}, \frac{3Q}{4}$

C. $\frac{3Q}{4}, \frac{3Q}{4}$

D. $Q, \frac{Q}{3}$

Answer: B

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15. A capacitor of capacitance C is initially charged to a potential difference of V. Now it is connected to a battery of 2V with opposite polarity. The ratio of heat generated to the final energy stored in the capacitor will be

A. $\frac{3}{2}CV^2$

B. $\frac{9}{2}CV^2$

C. CV^2

D. $\frac{9}{4}CV^2$

Answer: B

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16. A current of 4 A is flowing in a cylindrical conductor. The number of free electrons passing per second through the cross-section of conductor is

A. $2 \cdot 10^{19}$

B. $3 \cdot 10^{20}$

C. $2.5 \cdot 10^{19}$

D. $4 \cdot 10^{18}$

Answer: C

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17. A current 0.5 amperes flows in a conductor of cross-sectional area of $10^{-2}m^2$. If the electron density is $0.3 \cdot 10^{28}m^{-3}$, then the drift velocity of free electrons is

A. $2.1 \cdot 10^{-5}ms^{-1}$

B. $2.5 \cdot 10^{-3}ms^{-1}$

C. $1.5 \cdot 10^{-6}ms^{-1}$

D. $1.04 \cdot 10^{-7} ms^{-1}$

Answer: D

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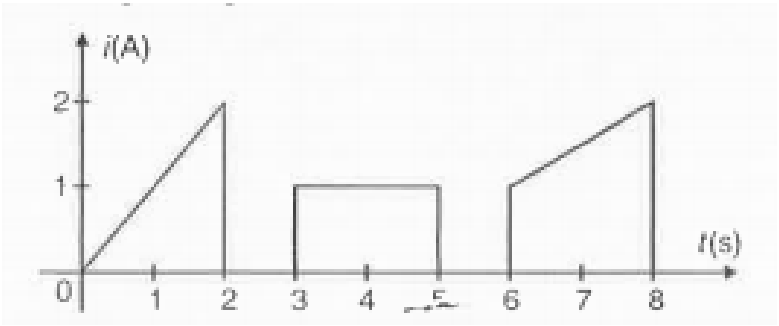
18. The plot represents the flow of current through a wire at three different times. The ratio of charges flowing through the wire at

different time is



A. 2 : 1 : 2`

B. 1 : 1 : 1`

C. 1 : 3 : 3`

D. 2 : 2 : 3`

Answer: D

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19. The specific resistance of a conductor increases with

A. Decrease in temperature

B. Increase in temperature

C. Decreases in cross -sectional area

D. Both (2) & (3)

Answer: B

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20. Copper and silicon is cooled from 300 K to 60 K, the specific resistance : -

A. Increases in both

B. Decreases in both

C. Increases in aluminium but decreases in germanium

D. Decreases in aluminium and increases in germanium

Answer: D

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21. The resistance of a metallic conductor increases with temperature due to.

A. Electron density increases

B. Relaxation time decreases

C. Length of wire decreases

D. All of these

Answer: B

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22. The resistivity of a wire at $20^\circ C$ and $100^\circ C$ is $3\Omega - m$ and $4\Omega - m$ respectively. The resistivity of the wire at $0^\circ C$ is

A. $\frac{11}{4}\Omega - m$

B. $\frac{4}{11}\Omega - m$

C. $\frac{3}{4}\Omega - m$

D. $\frac{11}{3}\Omega - m$

Answer: A

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23. The drift velocity of free electrons in a conductor of length 6 m is 0.25 ms^{-1} under the application of potential difference of 100 V. The mobility of free electrons is

A. $2 \cdot 10^{-3} m^2 V^{-1} s^{-1}$

B. $2.5 \cdot 10^{-2} m^2 V^{-1} s^{-1}$

C. $1.5 \cdot 10^{-2} m^2 V^{-1} s^{-1}$

D. $1.5 \cdot 10^{-3} m^2 V^{-1} s^{-1}$

Answer: C

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24. Resistivity of a material of wire is $3 \cdot 10^{-6}\Omega - m$ and resistance of a particular thickness and length of wire is 2Ω. If the diameter of the wire gets doubled then the resistivity will be

A. $1.1 \cdot 10^{-2}\Omega - m$

B. $1.5 \cdot 10^{-3}\Omega - m$

C. $2 \cdot 10^{-6} \Omega - m$

D. $3 \cdot 10^{-6} \Omega - m$

Answer: D

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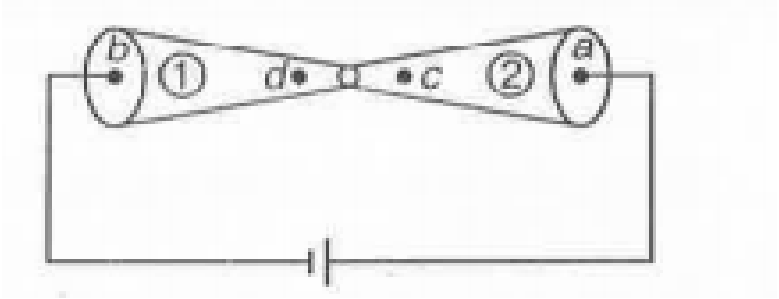
25. Two conductors of equal volumes having non-uniform cross-section are joined as show in figure. The number density of free electrons is more in conductor 2. As current passes through the system. Which of the following

option is correct ?



A. Drift speed of electrons at a = Drift speed of electrons at b

B. Drift speed of electrons at c = Drift speed of electrons at d

C. Drift speed of electrons at clt Drift speed of electrons at a

D. Drift speed of electrons at b gt Drift speed of electrons at a

Answer: D

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26. A resistance R of thermal coefficient of resistivity α is connected in parallel with a resistance 3R having thermal coefficient of resistivity 2α. Find the value of α_{eff}

A. $\frac{5\alpha}{2}$

B. 3α

C. $\frac{2\alpha}{3}$

D. $\frac{5\alpha}{4}$

Answer: D

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27. The area of cross-section of a current carrying conductor is $A_\circ$ and $\frac{A_\circ}{4}$ at section (1) and (2) respectively If $V_1 . V_2$ and $E_1 . E_2$ be

the drift velocity and electric field at section 1 and 2 respectively then 

A. $V_1 : V_2 = 1:4$ and $E_1 : E_2 = 4:1$

B. $V_1 : V_2 = 4:1$ and $E_1 : E_2 = 1:2$

C. $V_1 : V_2 = 2:1$ and $E_1 : E_2 = 1:4$

D. $V_1 : V_2 = 1:4$ and $E_1 : E_2 = 1:4$

Answer: D

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