PHYSICS

AAKASH INSTITUTE ENGLISH

MOCK TEST 2

Example

1. A man runs along the straight road for half the distance with velocity v_1 and the remaining half distance with velocity v_2. Then the average velocity is given by

A. $\dfrac{2v_1v_2}{v_1 + v_2}$

B. $\dfrac{v_1 + v_2}{2}$

C. $\dfrac{v_1v_2}{2}$

D. $\dfrac{v_1^2 + v_2^2}{2v_1v_2}$

Answer: A

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2. Which of the following statement is not true?

A. If displacement of a particle is zero, then distance covered may or may not be zero

B. If the distance covered is zero then the displacement must be zero

C. The numerical value of ratio of displacement to distance is equal to or less than one

D. The numerical value of the ratio of velocity to speed is always less than one

Answer: D

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3. A body covers first one-third of the distance with a velocity 10 ms^{-1} in same direction, the second one-third with a velocity $20ms^{-l}$ and last one-third with a velocity of $30ms^{-1}$. The average velocity of body is

A. $17.8 ms^{-1}$

B. $16.4 ms^{-1}$

C. $18.3 ms^{-1}$

D. $20.2 ms^{-1}$

Answer: B

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4. The differentiation of function $r(x) = (3x + 2)^{\frac{3}{2}}$ w.r.t x is

A. $\frac{9}{2}(3x+2)^{\frac{1}{2}}$

B. $\frac{3}{2}(3x+2)^{\frac{1}{2}}$

C. $\frac{3}{9}(3x+2)^{-\frac{1}{2}}$

D. $\frac{9}{2}(3x+2)^{-\frac{3}{2}}$

Answer: A

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5. A boy completes one round of a circular track of radius 20 m in 50 seconds. The displacement at the end of 4 minute 10 second will be

A. 40 m

B. 20 m

C. $80\pi m$

D. Zero

Answer: D

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6. A cyclist starts from the centre O of circular path of radius 10 m, covers the radius of circular path and reaches at point X on circumference, then cycles along the semi-circular path and reaches the point Y. If he takes 10 minutes to go from O to Y via X, then the net displacement and average speed of the cyclist would be

A. $Zero, 10ms^{-1}$

B. $10m, \left(\frac{1+\pi}{60}\right)ms^{-1}$

C. $10m, \left(\frac{1+\pi}{6}\right)ms^{-1}$

D. $10m, \left(\frac{1-\pi}{60}\right)ms^{-1}$

Answer: B

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7. The derivative of f(x)=$3x^2$ +2x + 4 w.r.t. x is

A. $3(6x+2)^2$

B. $6x+4$

C. $3(2x+3)$

D. $6x+2$

Answer: D

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8. A cyclist moves in such a way that he takes 72° turn towards left after travelling 200 m in straight line. What is the displacement when he takes just takes fourth turn?

A. Zero

B. 600m

C. 400 m

D. 200 m

Answer: D

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9. The derivative of function f(x) = $\log_e(2x)$ w.r.t. t is

A. $f(x) = \frac{1}{2x}\frac{dx}{dt}$

B. $f(x) = \frac{1}{x}\frac{dx}{dt}$

C. $f(x) = \frac{1}{x^2}\frac{dx}{dt}$

D. $f(x) = \frac{1}{2x^2}\frac{dx}{dt}$

Answer: B

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10. An object moves 10 m in 4 s then turns left and moves 20 m in next 5 s. What is the average speed of the object?

A. $10\frac{m}{s}$

B. $\frac{10}{3}\frac{m}{s}$

C. $\frac{20}{3}\frac{m}{s}$

D. $4.5\frac{m}{s}$

Answer: B

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11. A particle moves on a straight line with velocity 2 m/s covers a distance of 5 m, returns back to initial position along same path with velocity 4 m/s. The distance and displacement covered by particle are respectively.

A. 10 m, zero

B. Zero, 10 m

C. 5 m, 5 m

D. Zero, zero

Answer: A

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12. If $x = 2t^3$ and $y = 3t^2$, then value of $\frac{dy}{dx}$ is

A. $\frac{t^2}{2}$

B. $\frac{2}{t^2}$

C. $\frac{1}{t}$

D. $\frac{1}{t^2}$

Answer: C

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13. If $x = 2(\theta + \sin\theta)$ and $y = 2(1 - \cos\theta)$, then value of $\frac{dy}{dx}$ is

A. $\tan\left(\frac{\theta}{2}\right)$

B. $\cot\left(\frac{\theta}{2}\right)$

C. $\sin\left(\frac{\theta}{2}\right)$

D. $\cos\left(\frac{\theta}{2}\right)$

Answer: A

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14. A body moves in straight line and covers first half of the distance with speed 5 m/s and second half in two equal halves with speed 4 m/s and 3 m/s respectively. The average velocity of the body is nearly equal to

A. 4 m/s

B. 3 m/s

C. 2 m/s

D. 2.5 m/s

Answer: B

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15. A truck moves a distance of 50 km. It covers first half of the distance at speed of 200 m/s and second half at speed v. If average speed of truck is 100 m/s then value of v is

A. 200 m/s

B. $\frac{200}{3}\frac{m}{s}$

C. $\frac{100}{3}\frac{m}{s}$

D. 100 m/s

Answer: B

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16. The displacement x of a particle moving along x-axis at time t is given by $x^2 = 2t^2 + 6t$. The velocity at any time t is

A. $\dfrac{4t+6}{x}$

B. $\dfrac{2t-x}{x}$

C. $4t+6$

D. $\dfrac{2t+3}{x}$

Answer: D

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17. The position of a particle with respect to time t along y-axis is given by : $y = 12t^2 - 2t^3$, where, y is in metres and t is in seconds. When the particle achieves maximum speed, the position of the particle would be

A. 64 m

B. 40 m

C. 16 m

D. 32 m

Answer: D

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18. $\int_2^4 \frac{1}{x} dx$ is equal to

A. $In2$

B. $2In2$

C. $In\left(\frac{3}{2}\right)$

D. $2In4$

Answer: A

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19. If $y = \log_{10} x$, then the value of $\frac{dy}{dx}$ is

A. $\frac{1}{x}$

B. $\frac{x}{\log_e 10}$

C. $\frac{\log_{10} e}{x}$

D. $\frac{\log_e 10}{x}$

Answer: C

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20. Let $y = x^2 + x$, the minimum value of y is

A. $-\frac{1}{4}$

B. $\frac{1}{2}$

C. 1/4`

D. $-\frac{1}{2}$

Answer: A

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21. if $y = A\sin(\omega t - kx)$, then the value of $\frac{dy}{dx}$ is

A. $A\cos(\omega t - kx)$

B. $-A\omega\cos(\omega t - kx)$

C. $AK\cos(\omega t - kx)$

D. $-AK\cos(\omega t - kx)$

Answer: D

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22. $\int_{r}^{\infty} \frac{Gm_1m_2}{r^2} dr$ is equal to

A. $\frac{Gm_1m_2}{r}$

B. $-\frac{Gm_1m_2}{r^3}$

C. $\frac{Gm_1m_2}{r^3}$

D. $-\frac{Gm_1m_2}{r}$

Answer: A

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23. If $y = A\sin(\omega t - kx)$, then the value of

$\frac{d^2y}{dt^2} / \frac{d^2y}{dx^2}$

A. $\frac{k^2}{\omega^2}$

B. $-\frac{k^2}{\omega^2}$

C. $\frac{\omega^2}{k^2}$

D. $-\frac{\omega^2}{k^2}$

Answer: C

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24. $\int_0^L \frac{dx}{ax+b} =$

A. $\frac{1}{b} In\left(\frac{aL+b}{b}\right)$

B. $-\frac{1}{a} In\left(\frac{aL+b}{b}\right)$

C. $\frac{1}{a} In\left(\frac{aL+b}{b}\right)$

D. $-\frac{1}{b} In\left(\frac{aL+b}{b}\right)$

Answer: C

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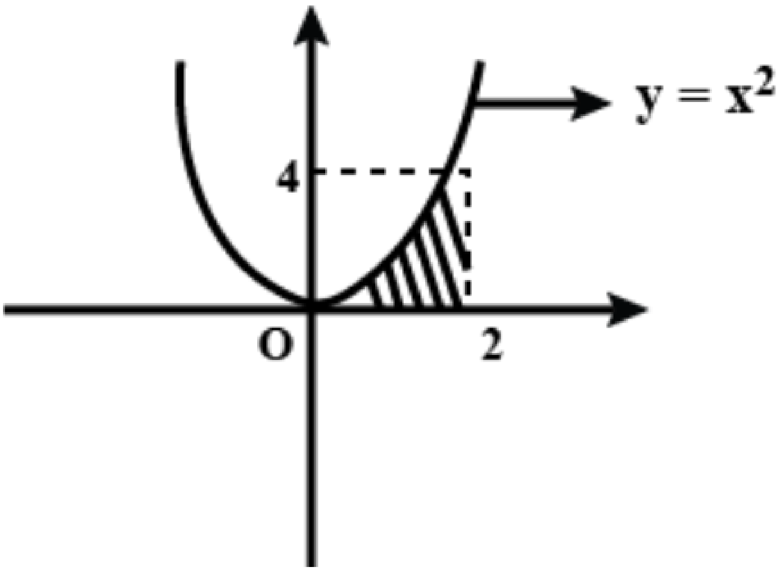
25. Consider the parabola $y = x^2$ The shaded area is



A. 2 / 3

B. 5 / 3

C. 7 / 3

D. 8 / 3

Answer: D

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26. A particle moves in a straight line so that $s = \sqrt{t}$, then its acceleration is proportional to

A. Velocity

B. $(Velocity)^{\frac{3}{2}}$

C. $(Velocity)^3$

D. $(Velocity)^2$

Answer: C

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27. The position x of particle moving along x-axis varies with time t as $x = A\sin(\omega t)$ where A and ω are positive constants. The acceleration a of particle varies with its position (x) as

A. $a = -\omega X^2$

B. $a = -\omega^2 X^3$

C. $a = \omega^2 A$

D. $a = -\omega^2 X$

Answer: D

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28. If $F = \dfrac{2}{\sin\theta + \cos\theta}$ then the minimum value of F out of the following option is

A. 1

B. $\frac{1}{\sqrt{2}}$

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

D. $\sqrt{2}$

Answer: D

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29. The acceleration of a particle moving along a straight line at any time t is given by a = 4 -

2v, where v is the speed of particle at any time t The maximum velocity is

A. 4 m/s

B. 2 m/s

C. 6 m/s

D. Infinity

Answer: B

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30. The velocity of a body depends on time according to the equative $v = 20 + 0.1t^2$. The body is undergoing

A. Uniform retardation

B. Uniform acceleration

C. Non uniform acceleration

D. Zero acceleration

Answer: C

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31. The displacement time graph of a particle executing S.H.M as shown in the figure.

The corresponding force-time graph of the partical will be

A.

B.

C.

D.

Answer: B

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32. As a body performs SHM, its potential energy U varies with time t as indicated in

A. 

B. 

C. 

D. 

Answer: A

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33. The potential energy of a particle executing S H M is 25 J. when its displacement is half of amplitude. The total energy of the particle is

A. 250 J

B. 180 J

C. 100 J

D. 25 J

Answer: C

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34. In S.H.M

A. Velocity is ahead of displacement by phase angle of π

B. Velocity is ahead of displacement by phase angle of $\frac{\pi}{2}$

C. Acceleration is ahead of displacement by phase angle of $\frac{\pi}{2}$

D. Acceleration is ahead of velocity by phase angle of π

Answer: B

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35. The force of a particle of mass 1 kg is depends on displacement as F = —4x then the frequency of S.H.M. is

A. πHz

B. $2\pi Hz$

C. $\frac{1}{\pi}Hz$

D. $\frac{1}{2\pi}Hz$

Answer: C

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36. The ratio of maximum velocity to the velocity of a particle performing S.H M at a point where potential energy is 25% of total energy is

A. $2:\sqrt{3}$

B. $\sqrt{3}:2$

C. $1:2$

D. $1:\sqrt{3}$

Answer: A

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37. If the length of a simple pendulum is equal to the radius of the earth, its time period will be

A. $\pi\sqrt{\frac{R}{g}}$

B. $2\pi\sqrt{\frac{R}{g}}$

C. $4\pi\sqrt{\frac{R}{g}}$

D. $2\pi\sqrt{\frac{R}{2}g}$

Answer: D

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38. A simple pendulum with a metallic bob has a time preiod 10 s. The bob is now immersed in a non-viscous liquide of density 1/3 that of metal. the time period of the same pendulum becomes

A. 10 s

B. $\frac{10}{\sqrt{2^s}}$

C. $10\sqrt{\frac{3}{2}}s$

D. $10\sqrt{3}s$

Answer: C

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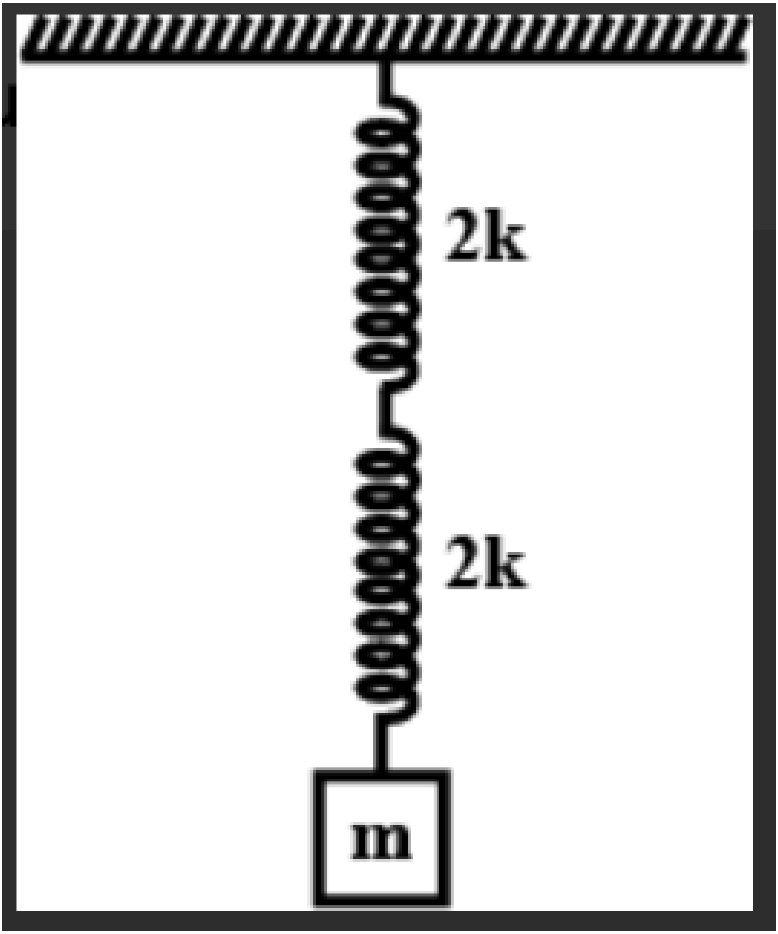
39. The time period of oscillation of the block as shown in figure is



A. $2\pi\sqrt{\frac{m}{2k}}$

B. $\pi\sqrt{\frac{m}{k}}$

C. $4\pi\sqrt{\frac{m}{k}}$

D. $2\pi\sqrt{\frac{m}{k}}$

Answer: D

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40. A simple pendulum of length 5 m is suspended from the ceiling of a cart. Cart is sliding down on a frictionless surface having angle of inclination 60°. The time period of the pendulum is

A. $2\pi s$

B. πs

C. $4\pi s$

D. $\frac{\pi}{2} s$

Answer: A

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41. A weightless spring has a force constant k oscillates with frequency f when a mass m is suspended from it The spring is cut into three equal parts and a mass 3 m is suspended from it The frequency of oscillation of one part will now become

A. f

B. 2 f

C. f / 3

D. 3 f

Answer: A

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42. A mass M attached to a spring oscillation with a period of $2s$. If the mass is increased by $2kg$, the period increases by 1s, find the initial mass m assuming that Hooke's law is obeyed.

A. 1.6 kg

B. 3.2 kg

C. 6.4 kg

D. 4.8 kg

Answer: A

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43. If a simple pendulum is taken on to the moon from the earth, then it

A. Runs faster

B. Runs slower

C. Shows no change

D. Will not perform S.H.M.

Answer: B

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44. For a spring-mass system spring having spring constant 19.7 N/m is attached to it. What should be the value of mass m (approx.) so that it will give the same period as that of seconds pendulum?

A. 1 kg

B. 2 kg

C. 3 kg

D. 4 kg

Answer: B

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45. Time period of a given spring-mass system is

A. $2\pi\sqrt{\frac{m}{k}}$

B. $\pi\sqrt{\frac{m}{k}}$

C. $\pi\sqrt{\frac{2m}{k}}$

D. $\pi\sqrt{\frac{m}{2}k}$

Answer: C

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46. For the small damping oscillator, the mass of the block is 500 g and value of spring constant is k = 50 N/m and damping constant is 10`gs^(-1) The time period of oscillation is (approx.)

A. $2\pi s$

B. $\frac{2\pi}{13}s$

C. $\frac{\pi}{5}s$

D. $\frac{\pi}{\sqrt{5}}s$

Answer: C

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47. A uniform solid sphere of mass m and radius R is suspended in vertical plane from a point on its periphery. The time period of its oscillation is

A. $2\pi\sqrt{\frac{r}{g}}$

B. $2\pi\sqrt{\frac{5R}{3g}}$

C. $2\pi\sqrt{\frac{7R}{5g}}$

D. $2\pi\sqrt{\frac{2R}{5g}}$

Answer: C

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48. The amplitude (A) of damped oscillator becomes half in 5 minutes. The amplitude after next 10 minutes will be

A. A

B. A/8

C. A/4

D. 4A

Answer: B

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49. The total force acting on the mass at any time t, for damped oscillator is given as (where symbols have their usual meanings)

A. $\vec{F} = -k\vec{x}$

B. $\vec{F} = -k\vec{x} - b\vec{v}$

C. $\vec{F} = -k\vec{x} - b\vec{v} + 2\vec{x}$

D. $\vec{F} = -b\vec{v} - bk^2\vec{x}$

Answer: B

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50. The characteristics of sound which is used to differentiate the sound of male and female

A. Loudness

B. Quality

C. Pitch

D. Amplitute

Answer: C

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51. The intensity of sound of 50 dB (Take reference of intensity 10^{-12} W/m^2)

A. $10^{-10}\dfrac{W}{m^2}$

B. $210^{-5}\dfrac{W}{m^2}$

C. $10^{-12}\dfrac{W}{m^2}$

D. $10^{-7}\dfrac{W}{m^2}$

Answer: D

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52. The number of decibels present in 10 bel is

A. 100 dB

B. 1 dB

C. 50 dB

D. 5 dB

Answer: A

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53. The intensity of sound from a radio at a distance of 2 metres from its speaker is $1 \times 10^{-2} \mu W / m^2$. The intensity at a distance of 10 meters would be

A. $10^{-8} \frac{W}{m^2}$

B. $4 \times 10^{-10} \frac{W}{m^2}$

C. $2 \times 10^{-8} \frac{W}{m^2}$

D. $5 \times 10^{-9} \frac{W}{m^2}$

Answer: B

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54. Which of the following statements about electromagnetic waves sound waves and water waves is/are correct?

1. They exhibit reflection

2 They carry energy

3. They exert pressure

4. They can travel in vacuum

Select the correct answer using the code given below:

A. Sound wave require medium to propagate

B. Sound wave is an electromagnetic wave

C. Sound wave do not require any medium to propagate

D. Both (2) and (3)

Answer: A

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55. The equation of a wave id represented as $Y = 2\sin(\Pi x - 200\Pi t)$ where x and y are in cm and t is in second. The wave velocity is

A. 100 cm/s

B. 200 cm/s

C. 50 cm/s

D. 400 cm/s

Answer: B

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56. The equation of a transverse wave is given by $y = 10 \sin 2\Pi(2x - 3t)$ where x and y are in cm and t is in s. Its frequency is

A. 1 Hz

B. 4 Hz

C. 2 Hz

D. 3 Hz

Answer: D

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57. The speed of sound is maximum in

A. steel

B. water

C. vaccum

D. air

Answer: A

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58. The distance between consecutive crest and trough of a wave is $10cm$. If the speed of wave is $200c\frac{m}{s}$. Then the time period of wave is

A. 0.01 s

B. 0.2 s

C. 0.02 s

D. 0.1

Answer: D

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59. If the wave changes its medium then which of the following physical quantity changes?

A. wavelength of wave

B. frequency of wave

C. speed of wave

D. both (1) and (3)

Answer: D

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60. The equation of wave is given as $y = 7\sin\Pi(x - 50t)$ where x and y are in cm t is in s. The ratio of wave velocity and maximum particle velocity is

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61. The velocity of transverse wave in string whose linear mass density is $3 \times 10^{-2} k\frac{g}{m}$ stretched by a load of 30 kg is (Take g=10$\frac{m}{s^2}$)

A. 10m/s

B. 30m/s

C. 300m/s

D. 100m/s

Answer: D

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62. According to laplace variation of speed of sound are

A. isothermal

B. isochoric

C. adiabatic

D. isobaric

Answer: C

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63. The speed of wave in a certain medium is $100\frac{m}{s}$. If 1000 waves pass over a certain point of the medium in 1 minute 40 second, the wavelength is

A. 2m

B. 4m

C. 8m

D. 10m

Answer: D

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64. The velocity of sound in air is $340\frac{m}{s}$. If the density of air is increased to 4 times, the new velocity of sound will be

A. 170m/s

B. 340m/s

C. 680m/s

D. 85m/s

Answer: A

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65. if the temperature is increased then the fundamental frequency of an open pipe is [neglect any expansion]

A. increases

B. decreases

C. remain same

D. maybe increases or decreases

Answer: A

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66. two waves $y_1 = 10\sin(\omega t - Kx)$ m and $y_2 = 5\sin\left(\omega t - Kx + \frac{\pi}{3}\right)$ m are superimposed. the amplitude of resultant wave is

A. $\sqrt{7}$ m

B. $2\sqrt{7}m$

C. $3\sqrt{7}$ m

D. $5\sqrt{7}$ m

Answer: D

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67. interferences of waves

A. is the superposition of two waves with constant phase difference

B. is the maximum positive displacement in a transverse wave

C. in the maximum negative displacement in a transverse wave

D. is the superposition of two waves with variable phase difference

Answer: A

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68. A tuning fork produces 4 beats per second when sounded togetehr with a fork of frequency 364 Hz. When the first fork is loaded with a little wax then the number of beats becomes two per second. What is the frequency of the first fork?

A. 365 Hz

B. 361 Hz

C. 360 Hz

D. 364 Hz

Answer: A

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69. the minimum distance between the reflecting surface and source for listening the eco of sound is (take speed of sound $340\frac{m}{s}$)

A. 34 m

B. 8.5 m

C. 17 m

D. 28 m

Answer: C

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70. Fundamental frequency of a organ pipe filled with N_2 is 500 Hz. the fundamental frequency if N_2 is replaced by H_2 is

A. $1000\sqrt{14}Hz$

B. $500\sqrt{14}Hz$

C. 500 Hz

D. 250 Hz

Answer: B

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71. Beats are result of

A. superposition of two waves of equal frequency

B. constructive interference

C. destructive interference

D. superposition of two waves of nearly equal frequency

Answer: D

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72. two piano keys are stuck simultaneously. the notes emitted by them have a frequencies 250 Hz and 253 Hz. the number of Beats heard per second is

A. 1

B. 2

C. 3

D. 4

Answer: C

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73. two waves $y_1 = 2.5 \sin 100\pi t$ and $y_2 = 2.5 \sin 102\pi t$ (where y is in meter and t is in second) are traveling in same direction. the number of beat heard per second is

A. one

B. two

C. three

D. four

Answer: A

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74. The length of two open organ pipes are l and $(l+\delta l)$ respectively. Neglecting end correction, the frequency of beats between them will b approximately.

A. $\frac{v}{2}l$

B. $\frac{v}{4}l$

C. $v\Delta\frac{l}{2}l^2$

D. $v\Delta\frac{l}{l}$

Answer: C

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75. two waves of wavelength 100 cm and 102 cm produce 12 beats per second having same velocity. the velocity of each wave is

A. 320 m/s

B. 612 m/s

C. 306 m/s

D. 220 m/s

Answer: B

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76. Three sound waves of equal amplitudes have frequencies $(v-1), v, (v+1)$. They superpose to give beats. The number of beats produced per second will be

A. 1

B. 2

C. 3

D. 4

Answer: B

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77. IF two tuning forks A and B are sounded together, they produce 4 beats per second. A is then slightly loaded with wax, they produce two beats when sounded again. The frequency of A is 256. The frequency of B will be

A. 248 Hz

B. 256 Hz

C. 258 Hz

D. 250 Hz

Answer: B

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78. a bus is moving with a velocity 4 m/s towards a wall, the driver sounds a horn of frequency 173 Hz . if the speed of sound in air is 350 m/s. the number of beat heard per second by a passanger on the bus will be

A. one

B. two

C. three

D. four

Answer: D

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79. a bus is moving in a circle around a listener with speed 20 m/s of radius 2 m. Bus driver blows a horn with frequency 210 Hz. the frequency of sound heard by the listener is

A. 212 Hz

B. 210 Hz

C. 218 Hz

D. 420 Hz

Answer: B

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80. a bus is moving towards and stationary observer with speed 20 m/s blows a horn of frequency 200 Hz. the frequency of sound heard by the observer is approximately (take speed of sound 320 m/s)

A. 188 Hz

B. 200 Hz

C. 226 Hz

D. 213 Hz

Answer: D

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81. A car blowing a horn of frequency 350 Hz is moving normally towards a wall a speed of 5 m/s The beat frequency heard by a person standing between the car and wall is (speed of sound in air =350 m/s)

A. 1

B. 0

C. 3

D. 4

Answer: D

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82. A car is moving with $90 km h^{-1}$ blows a horn of 150 Hz, towards a cliff. The frequency of the reflected sound heard by the driver will

be (speed of sound in air is $340 ms^{-1}$)

A. 100 Hz

B. 150 Hz

C. 170 Hz

D. 130 Hz

Answer: B

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83. Which of the following is correct?

A. Doppler effect is symmetry in case of electromagnetic wave and asymmetric in case of sound wave

B. Doppler effect is asymmetric in case of electromagnetic wave and symmetric in case of sound wave

C. Doppler effect is asymmetric in both electromagnetic as well as sound wave

D. Doppler effect is symmetry in both electromagnetic as well as sound wave

Answer: A

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84. in which of the following case frequency of sound heard by the observer increases?

A. when source are moving away from the stationary observer

B. when observer are moving away from the stationary source

C. when both observer and source are moving away from each other

D. when both observer and source are moving towards each other

Answer: D

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85. The perimeters of tow similar triangles ΔABC and ΔPQR are 35cm and 458 cm respectively, then the ratio of the areas of the two triangles is ______.

A. 0.1s

B. 0.2s

C. 0.5s

D. 0.3s

Answer: B

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86. If a body is charged by rubbing it , its weight

A. Remain constant

B. Decreases

C. Increases

D. May increase ar may decrease

Answer: D

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87. Which of thoe folowing option is correct

A. The total number of charged particles in the universe remains conserved

B. The magnitude of total positive charge of the universe is constant

C. The magnitude of total negative charge of the universe is constant

D. The total charge of the universe is constant

Answer: D

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88. If an object contains n_1, protons and n_2 electrons the net charge on the object is

A. $(n_1 + n_2)e$

B. $(n_1 - n_2)e$

C. $(n_2 - n_1)e$

D. Zero

Answer: B

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89. A spherical conductor is placed near another positively charged conductor. The net charge acquired by spherical conductor will be

A. Either postive or negative

B. Positive only

C. Negative only

D. Zero

Answer: D

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90. if a charged body is brought near a charged electroscope, then

A. The leaves will further diverge the charge on he body is opposite to that on the eletroscope

B. The leaves will converge, if the charge on the body is opposite to that on the electroscope

C. The leaves will further diverge if the charge on the body is similar to that on the electroscope

D. Both (2) and (3)

Answer: D

Watch Video Solution

91. A positive point charge Q is bruought mear an isolated metal cube.

A. The interior of the cube becomes negatively charged and surface becomas positively charged

B. The interior of the cube becomes positively charged and surface becomes negatively in the charged. of the

C. The interior remains charge free and the surface gets non-umiform charge distribution of the

D. The interior remains charge free and the surtace gets uniform charge distribution constant

Answer: C

Watch Video Solution

92. Two identical metallic spheres X and Y with electrons supported on insulating stands and placed in contact. What kind of charges will be daveioped on X and Y when a negatively charged ebonite rod is brought near X?

A. Xwil have negative charge and Ywill have a positive charge

B. Ywil nave negative charge and X will have positive charge

C. Both X and Ywil have postive charges

D. Both X and Ywil have negative charges

Answer: B

Watch Video Solution

93. One metallic sphere A is given positive charge wherease another identical metallic sphere B of exactly same mass as of A is given equal amount of negative charge. Then,

A. Remains sarme on the electroscope

B. Mass of sphere A $>$ mass of sphere B charge on electroscope

C. Mass of sphere A lt mass of sphere B charge on electroscope

D. Cannct be predicted

Answer: B

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94. Two copper pieces, each of mass 0.0635 kg are placed at a distance of 0.1 m from each other One electron from each atom of piece 1 is transferred to piece 2 of copper. Net charges on piece 1 and piece 2 after transfer of electrons respectively will be

A.

$$q_1 = -1.6x10^{-19}C, q_2 = +1.6x10^{-19}C$$

B. $q_1 = -9.6x10^4C, q_2 = +9.6x10^4C$

C.

$$q_1 = +1.6x10^{-19}C, q_2 = -1.6x10^{-19}C$$

D. $q_1 = +9.6x10^4C, q_2 = -9.6x10^4C$

Answer: D

Watch Video Solution

95. Positive and negative charge in 18 cc of water is

A. $q = (\pm)9.63X10^5C$

B. $q = (\pm)1.63X10^5$C

C. $q = (\pm)9.63X10^{-5}C$

D. $q = (\pm)2.63X10^{-5}C$

Answer: A

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96. Two bodies X and Y carry charges −6.6μC and −5μC. How many electrons should be transferred from X to Y so that they acquire equal charges?

A. $2X10^{12}$

B. $5X10^{13}$

C. $5X10^{12}$

D. $2X10^{13}$

Answer: C

Watch Video Solution

97. If an object made of substance A is rubbed with an object made of substance B, then A becomes positively charged and B becomes negatively charged. If however, an object made of substance C, then A becomes negatively charged, What will happen if an object made of substance B is rubbed against an object made of substance C?

(a) B becomes positively charged and C becomes positively

(b) B becomes positively charged and C

becomes negatively charged.

(c) B becomes negatively charged and C becomes positively charged.

(d) B becomes negatively charged and C becomes negatively charged.

A. Q becomes positively charged, R becomes positively charged

B. Q becomes positively charged, R becomes negatively charged

C. Q becomes negatively charged, R becomes positively charged

D. Q becomes negatively charged, R becomes negatively charged

Answer: C

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98. Which of the following option(s) is correct?

A. A positively charged body can attract another positively charged body

B. Induced charge can never be greater than inducing charge

C. A positively charged body can attract uncharged metal body

D. All of these

Answer: D

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99. Two equally charged identical metal spheres X and Y repel each other with a force $5 \cdot 10^{-4} \cdot$ N another identical uncharged sphere C is touched to A and then placed at the mid-point between X and Y. Net electric force on C is

A. $5x10^{-4}N$

B. $15x10^{-4}N$

C. $3x10^{-4}N$

D. zero

Answer: A

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100. Two point charges +10 muC and +20 muC repel each other with a force of 100N. If a charge of-2 muC is added to each charge, then force between them will become

A. 72N

B. 7.2N

C. 720N

D. 100N

Answer: A

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101. Two charges exert a force of 10 N on each other when separated by a distance 0.2 m in air. When they are placed in another medium of dielectric constant $K = 4$, and separated by distance R. they exert same force. The distance R equats to

A. 2m

B. 1m

C. 0.2m

D. 0.1m

Answer: D

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102. For the system shown below, the value of Q for which resultant force on q is zero is

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103. The force of repulsion between two point charges is F, when these are at a distance of 1 m apart Now the point charges are replaced by spheres of radii 25 cm having the same charge as that of point charge and same distance apart. Then the new force of repulsion will

A. Increase

B. decrease

C. Remain same

D. First increase then decrease

Answer: B

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104. The force between two point charges in air is 100 N. If the distance between them is increased by 50%, then the force between two charges will be nearly equal to

A. 50N

B. 56N

C. 100N

D. 44N

Answer: D

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105. Two identical metal spheres having charges +q and +q respectively. When they are separated by distance r, exerts force of repulsion F on each other. The spheres are allowed to touch and then moved back to same separation. The new force of repulsion will be

A. $\frac{F}{2}$

B. F

C. $\frac{F}{4}$

D. $\frac{F}{10}$

Answer: B

Watch Video Solution

106. A positive charge 50 muC is located in xy plane at a position vector $r_0 = 4\hat{i} + 4\hat{j}$. the electric field strength E at a point whose position vector is $\overrightarrow{r} = 10\hat{i} - 4\hat{j}$ is ($\overrightarrow{r}_0$ and $\overrightarrow{r}$ are expressed in metre)

A. $\left(-1.6\hat{i} - 3.6\hat{j}\right)k\frac{V}{m}$

B. $\left(3.6\hat{i} + 1.6\hat{j}\right)k\frac{V}{m}$

C. $\left(\hat{i} - 3\hat{j}\right)k\frac{V}{m}$

D. $\left(2.7\hat{i} - 3.6\hat{j}\right)$ kV/m

Answer: D

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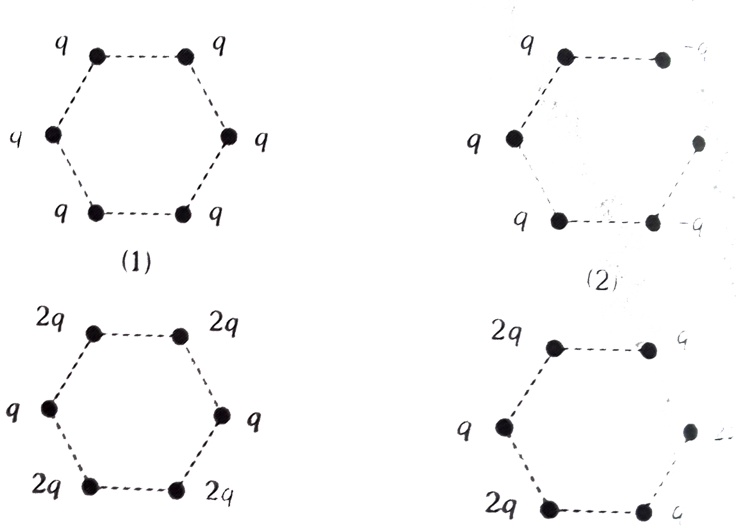
107. Figure below show regular hexagons, with charges at the vertices. In which of the following cases the elecetric field at the centre is not zero ?



A. (a)

B. (b)

C. (c)

D. (d)

Answer: A

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108. two point charges + 16 q and -4q located at x=0 and x=L respectively. the location of a point on the x-axis from x=0, at which the net electric field due to these two charges is zero is

A. L

B. 2L

C. $\frac{L}{2}$

D. $\frac{L}{4}$

Answer: B

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109. a proton placed in an electric field would experience an electrical force equal to its weight. the magnitude of electric field intensity E would be

A. $m^2 \frac{g}{e}$

B. $e^2 \frac{m^2}{g}$

C. mg/e

D. e/mg

Answer: C

Watch Video Solution

110. the electric field at origin due to infinite number of changes as shown in figure is

A. $4K \frac{q}{5}$

B. $4K\frac{q}{3}$

C. $3K\frac{q}{4}$

D. $5K\frac{q}{4}$

Answer: B

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111. what is the net force on a dipole in a uniform electric field ?

A. can never be zero

B. is always zero

C. depends on the orientation of the dipole

D. depends on the strength of the dipole

Answer: B

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112. a positive test charge is released in the following field. at which point the acceleration of the test charge is maximum?

A. A

B. B

C. C

D. D

Answer: A

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113. A small electric dipole is placed at origin with its dipole moment directed along positive x-axis. The direction of electric field at point $(2, 2\sqrt{2}, 0)$ is

A. along positive z axis

B. along positive y axis

C. along negative y axis

D. along negative z axis

Answer: B

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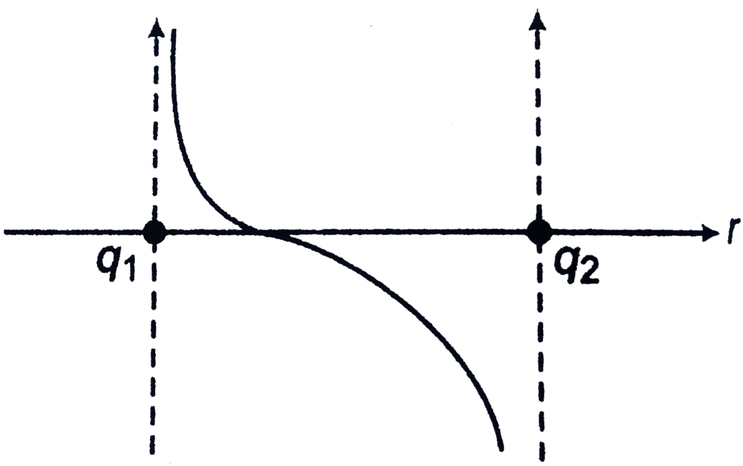
114. The variation of electric field between two charge q_1 and q_2 along the line joining the charges is plotted against distance from q_1 (taking rightward direction of electric field as positive) as shown in the figure. Then the correct statement is



A. q_1 and q_2 are positive and abs

$(q_1) > |q_2|$

B. q_1 and $q_2$are positive and$|q_1| < |q_2|$

C. q_1 is positive and q_2 is negative

$|q_1| < |q_2|$

D. q_1 is negative and q_2 is positive

$|q_1| > |q_2|$

Answer: B

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115. find the magnitude of dipole moment of the the following system

A. qasqrt21

B. qasqrt13

C. 4qa

D. Zero

Answer: B

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116. The SI unit of electric flux is

A. $N - \frac{m^2}{C^2}$

B. $\frac{N}{C^2 - m^2}$

C. V-m

D. $V - m^3$

Answer: C

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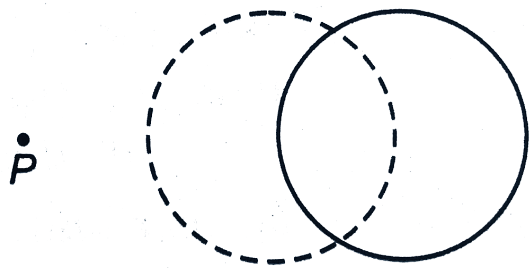
117. Figure shows a closed dotted surface which intersects a conduccting uncharged shere. If a positive charge is placed at the point P, the flux of the electric field through the closed surface



A. will remain zero

B. will be negative

C. will be positive

D. will be infinite

Answer: B

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118. An electric dipole is placed at the centre of a hollow conducting sphere. Which of the following is correct ?

A. the electric field is zero at every point of the spere

B. the flux of the electric field through to the sphere is zero

C. the electric field is not zero at anywhere on the sphere

D. both (2) and (3)

Answer: D

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119. In a region of space, the electric field is given by $\overrightarrow{E} = 8\hat{i} + 4\hat{j} + 3\hat{k}$. The electric flux through a surface of area 100 units in the xy plane is

A. 800 units

B. 300 units

C. 400 units

D. 1500 units

Answer: B

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120. Under what conditions can the electric flux ϕ_E be found through a closed surface?

A. if the magnitude of the electric field is known everywhere on the surface

B. if the total charge outside the surface is specified

C. only if the location of each point charge inside the surface is specified

D. if the total charge inside the surface is specified

Answer: D

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121. If the flux of the electric field through a closed surface is zero,

A. the charge outside the surface must be zero

B. the electric field must be zero everywhere on the surface

C. the total charge inside the surface must be zero

D. the electric field must be uniform throughout the closed surface

Answer: C

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122. An electric dipole is placed in an electric field generated by a point charge

A. the net electric force on the dipole must be zero

B. the date electric force of the dipole may be zero

C. the torque on the dipole due to the field must be zero

D. the torque on the dipole due to the field may be zero

Answer: D

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123. A proton and an electron are placed in a uniform electric field. Which of the following is correct?

A. the elective forces acting on them will be equal

B. their acceleration will be equal

C. the magnitude of the forces will be equal

D. the magnitude of their acceleration will be equal

Answer: C

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124. consider the situation shown in the figure the ratio $\frac{q_2}{q_1}$ is

A. 36

B. 18

C. 6

D. 3

Answer: D

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125. four charges are placed each at a distance from origin. the dipole moment of configuration is

A. $2qa\hat{j}$

B. $3qa\hat{j}$

C. $2aq(i + j)$

D. $3aq(i - j)$

Answer: A

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126. which of the following statement is correct?

A. electric field calculated by gauss law is the the field due to only those charges which are enclosed inside the Gaussian surface

B. gauss law is applicable only when there is a symmetrical distribution of charge

C. electric flux through a closed surface is equal to total / due to all the charge enclosed with in that surface only

D. all of this

Answer: C

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127. Consider two concentric spherical surfaces S_1 with radius a and S_2 with radius 2a, both centered at the origin. There is a charge +q at the origin and there are no other charges.

Compare the flux ϕ_1 through S_1 with the flux ϕ_2 through S_2.

A. $\phi_1 = 2\phi_2$

B. $\phi_1 = 4\phi_2$

C. $\phi_1 = \phi_2$

D. $\phi_1 = \frac{\phi_2}{2}$

Answer: C

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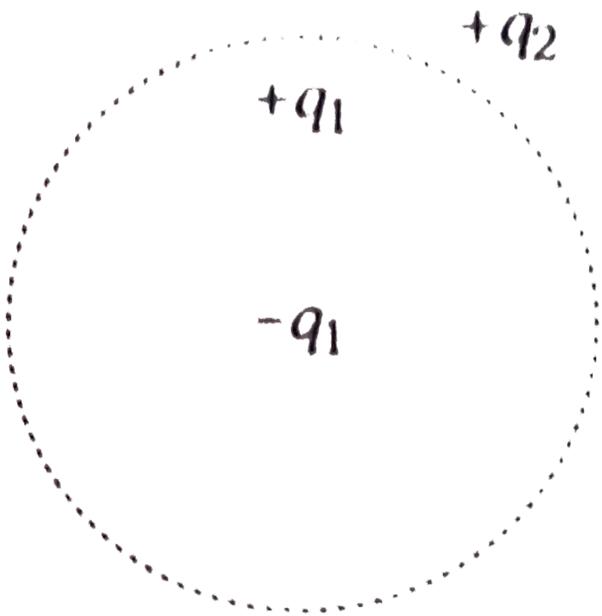
128. Consider the charge configuration and spherical Gaussian surface as shown in the figure. When calculating the flux of the electric field over the spherical surface the electric field will be due to



A. $q_1$and q_2 alone

B. q_1, $q_2$and $q_3$alone

C. q_3 and$q_4$alone

D. all charges q_1, q_2, q_3 and q_4

Answer: D

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129. an electric dipole is placed perpendicular to an charge at some distance as shown in figure identify the correct statement

A. the dipole is attached towords the line charge

B. the dipole is repelled away from the line charge

C. the dipole does not experience a force

D. the type of experience the force as well as the torque

Answer: A

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130. a circular ring carries a chargeQ_1 the variation of electric field with distance x measured from centre along Axis for x>>R can be given as (R radius of ring)

A. $E \propto \frac{1}{x^3}$

B. $E \propto x$

C. $E \propto \frac{1}{x^2}$

D. $E \propto \frac{1}{x}$

Answer: C

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131. the linear change density of the semicircular ring on both side is same in magnitude. the electric field intensity at O is along

A. $\hat{i}$

B.

C. $\hat{j}$

D. #NAME?

Answer: A

Watch Video Solution

132. A thin conducting spherical shell of radius R has charge Q spread uniformly over its surface. Using Gauss's law, derive an expression for an electric field at a point outside the shell.

Draw a graph of electric $E(r)$ with distance r from the centre of the shell for

A.

B.

C.

D.

Answer: C

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133. the figure shows the path of A positively charged particle through a rectangular region of uniform electric field as shown in the figure. the direction of deflection of particle 2, 3 and 4 is

A. down, down, up

B. up, up, down

C. down,. up, down

D. up, down, down

Answer: C

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134. The maximum electric field intensity on the axis of a uniformly charged ring of charge q and radius R will be

A. $\frac{1}{4}\pi\varepsilon_0\frac{q}{3}\sqrt{2}R^2$

B. $\frac{1}{4}\pi\varepsilon_0 2\frac{q}{3}R^2$

C. $\frac{1}{4}\pi\varepsilon_0\frac{q}{3}\sqrt{3}R^2$

D. $\frac{1}{4}\pi\varepsilon_0 2\frac{q}{3}\sqrt{3}R^2$

Answer: D

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135. the given figure shows two parallel plates A and B of change densities $+3\sigma$ and -3σ

respectively. electric intensity will be zero in the

A. region I and II

B. region II and III

C. region II

D. region I and III

Answer: D

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136. in the given figure a cone lies in a uniform electric field E the electric flux entering the cone is

A. $ER\frac{h}{2}$

B. 2ERh

C. ERh

D. zero

Answer: C

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137. Two identical infinite positive line changes are places into the lines $x = \pm a$ in the $x = y$ plane. A positive point charge placed at origin is restricted to move along x-axis its equilibrium is

A. unstable

B. stable

C. neutral

D. none of these

Answer: B

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138. Mark the correct statement :.

A. if we displays the enclosed charges (with a Gaussian surface) without crossing the boundary then both vecE and phi remain same

B. if we displays the enclosed changes without crossing the boundary then vecE changes but phi remains the same

C. if the charge crosses the boundary then both vecE and phi would change

D. both (2) and (3)

Answer: D

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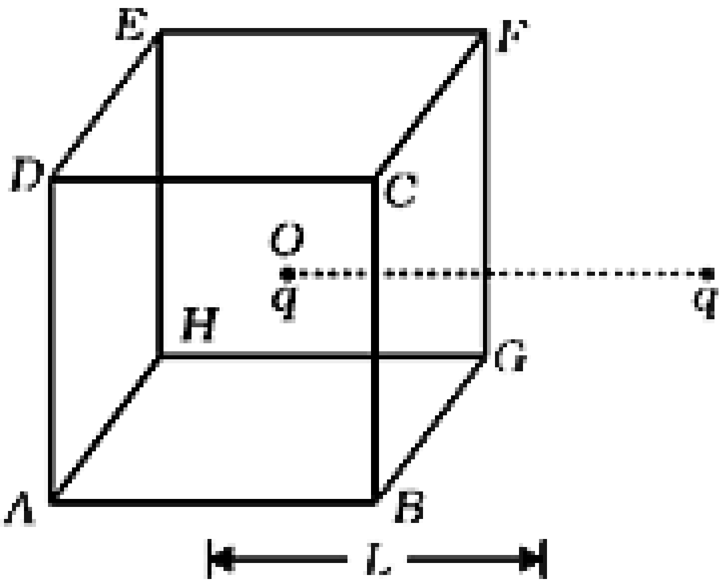
139. A charged particle q is placed at the centre O of cube of length L(ABCDEFGH). Another same charge q is placed at a distance L from O.Then, the electric flux through ABCD is :



A. $\frac{q}{4}\pi\varepsilon_0 L$

B. $\frac{q}{2}\pi\varepsilon_0 L$

C. $2\frac{q}{2}\pi\varepsilon_0 L$

D. Zero

Answer: D

Watch Video Solution

140. a hemispherical hollow body is placed in a uniform electric field E. the total flux linked with the curved surface is

A. $\pi R^2 E$

B. $2\pi R^2 E$

C. $4\pi R^2 E$

D. Zero

Answer: D

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141. Three charges 2 μC , -4 μC and 8 μC are places at the three vertices of an equilateral triangle of side 10 cm. The potential at the centre of triangle is

A. 14×10^4 J/C

B. 9×10^4 J/C

C. 54×10^4 J/C

D. $54\sqrt{3} \times 10^4$ J/C

Answer: D

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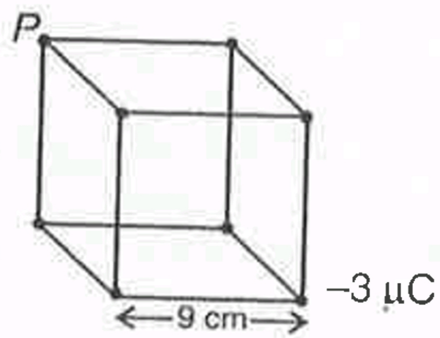
142. A charge -3 μC is placed at one corner of cube of side 9 cm . The potential at a point P which diagonally opposite as shown in fugure is



A. $-\sqrt{3} \times 10^5$ J/C

B. $2\sqrt{3} \times 10^4$ J/C

C. $-9\sqrt{3} \times 10^5$ J/C

D. $4\sqrt{3} \times 10^4$ J/C

Answer: A

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143. Two charges -4 μC and 8 μC are 27 cm apart. The distance from the first charge on line of joining between two charges where electric potential would be zero is

A. 10 cm

B. 9 cm

C. 20 cm

D. 21 cm

Answer: B

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144. An electric field $\overrightarrow{E} = 20y\hat{j}$ exist in space . The potential at (5 m, 5 m) is taken to be zero. The potential at origin is

A. 500 V

B. 250 V

C. 125 V

D. Zero

Answer: B

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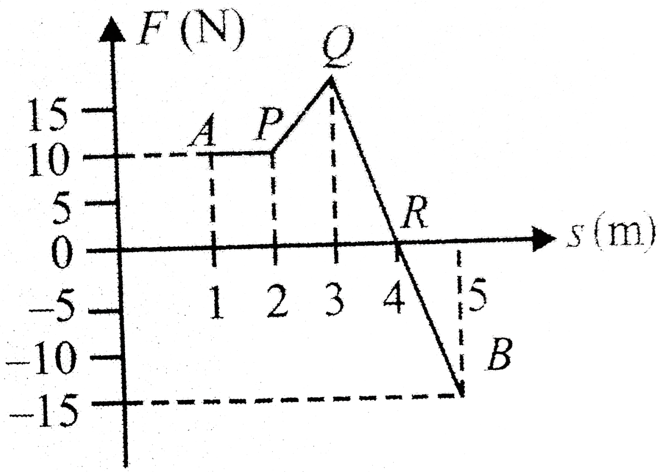
145. A body moves from point A to B under the action of a force, varying in magnitude as shown in figure. Obtain the work done. Force is expressed in newton and displacement in meter.



A. 1×10^5 J

B. 3×10^5 J

C. 9×10^5 J

D. 12×10^5 J

Answer: C

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146. Potential of electric ield vector is given by V= 9 $\left(x^3 - y^3\right)$, (where , xand y are cartesian Co-ordinates). The electric field strenth vector is

A. $-27x^2\hat{i} + 27y^2\hat{j}$

B. $27x\hat{i} + 27y\hat{j}$

C. $27x^2y\hat{i} + 27xy^2\hat{j}$

D. $-27xy\hat{i}+27xy\hat{j}$

Answer: A

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147. In the figure given below , the zero potential is taken at infinity. The work done in moving a unit charge from A to B is , Where $V_A rightarrow$ potential at point A, $V_B rightarrow$ potential at point B

A. $V_B - V_A$

B. $V_B + V_A$

C. Zero

D. infinity

Answer: A

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148. The electric field strenth vector is given by E=$2.5x\hat{I} + 1.5y$^.The potential at point (2,2,1) is (considering potential at origin to be zero)

A. -2 V

B. -4 V

C. -6 V

D. -8 V

Answer: D

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149. Two point charges $4\mu C$ and $-2\mu C$ are separated by a distance of 1m in air. Calculate at what point on the line joining the two charges is the electric potential zero ?

A. $9a \times 10^{-3}$ V

B. $a \times 10^{-3}$ V

C. $3a \times 10^{-9}$ V

D. $3a \times 10^{-3}$ V

Answer: A

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150. Two electric dipoles are placed parallel to each other as shown in figure. The potential at apoint P is

A. $K\frac{2q}{(r_1)^2}$

B. $K\frac{5q}{(r_1)^2+(r_1)^2}$

C. $K\frac{3q}{(r_2)^2}$

D. Zero

Answer: D

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151. The potential due to a short electric field dipole moment 2×10^{-6} C-m along its axis point 4 m from dipole is

A. $\left(\frac{9}{8}\right) \times 10^{3}$ V

B. $\left(\frac{9}{8}\right) \times 10^{-3}$ V

C. $\left(\frac{8}{9}\right) \times 10^{2}$ V

D. Zero

Answer: A

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152. Six charges , $q_1 = +1\ \mu$C , $q_2 = +3\ \mu$C , $q_3 = +4\ \mu$C , $q_4 = -2\ \mu$C , $q_5 = -3\ \mu$C and $q_6 = -3\ \mu$C are placed on a sphee of radius 10 cm. The potential at centre of sphere is

A. 27×10^5 V

B. Zero

C. 2.7×10^5 V

D. $0.27 \times 10^5 V$

Answer: B

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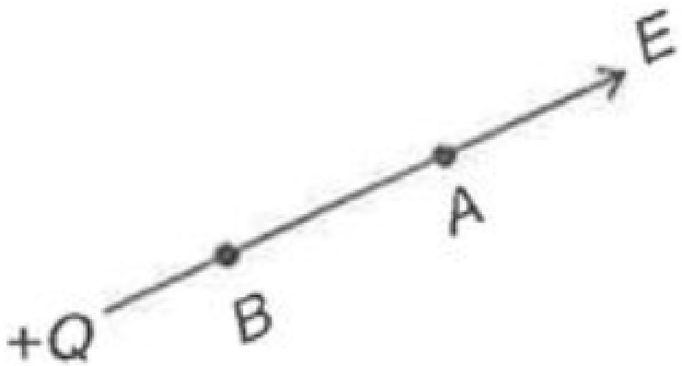
153. A test charge q is taken from point A to B in electrostatic field of other charge Q as shown in figure. The reletion between potetial energy and potential (between points A and



B) is

A. $(P.E)_A B = V_A - V_B$

B. $(P.E)_A B = -(V_A - V_B)q$

C. $(P.E)_A B = (V_A + V_B)q$

D. Information given is insufficient

Answer: B

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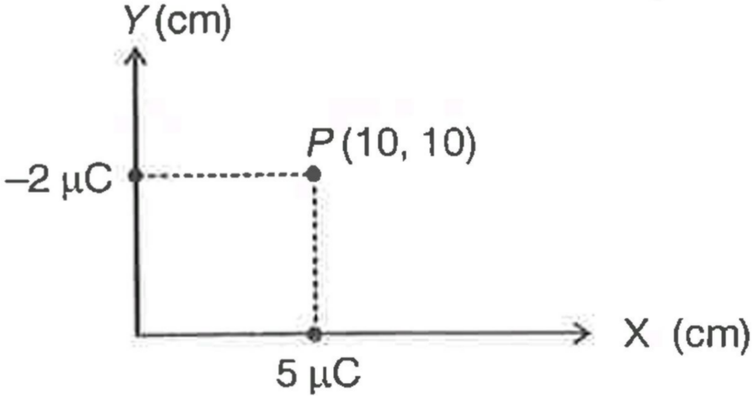
154. Two charges are placed s shown in figure below. The potential at point P is



A. 27×10^4 V

B. 2.7×10^4 V

C. 0.27×10^4V

D. Zero

Answer: B

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155. Two Charges 5 μC and 20 μC are placed on two concentric circes of radius 10 cm and 20 cm respectively lying in x-y plane . The potential at centre is

A. 1.35×10^4 V

B. 13.5×10^4 V

C. 135×10^4V

D. Zero

Answer: C

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156. Three charges $2q, \; -q, \; -q$ are located at the vertices of an equilateral triangle. At the centre of the triangle,

A. The field is zero but potential is non-zero

B. The field is non-zero but potential is zero

C. Both field and potential are zero

D. Both field and potential are non-zero

Answer: B

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157. Three concentric spherical shells have radii a, b and $c(a < b < c)$ and have surface charge densities $\sigma, -sigam$ and σ respectively. If V_A, V_B and V_C denote the potentials of the three shells, then for $c = a + b$, we have

A. $V_C = V_A \neq V_B$

B. $V_C = V_B \neq V_A$

C. $V_C \neq V_B \neq V_A$

D. $V_C = V_B = V_A$

Answer: A

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158. Two charges +6 'mu'C and -6 'mu'C are placed 15 cm apart as shown . At what distance from A to its right, the electrostatic potential is zero (distance in cm)

A. 4,9,60

B. 9,45,infinity

C. 20,45,infinity

D. 9,15,45

Answer: B

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159. The electric potential at a point (x,y,z) is given by $V = -x^2y - xz^3 + 4$ The electric field E at that points is

A. $\overrightarrow{E} = (2xy + z^3)\hat{i} + x^2\hat{j} + 3xz^2\hat{k}$

B.

$$\overrightarrow{E} = 2xy\hat{i} + (x^2 + y^2)\hat{j} + (3xz - y^2)\hat{k}$$

C. $\overrightarrow{E} = z^3\hat{i} + xyz\hat{j} + 3^2\hat{k}$

D. vec E= (2xy-z^3)hat i+xy^2 hat j+3z^2 x

hat k'

Answer: A

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160. The electric field in a certain region is given by $E = 5\hat{\imath} - 3\hat{\jmath} kv/m.$ The potential difference $V_B - V_A$ between points a and B having coordinates (4, 0, 3) m and (10, 3, 0) m respectively, is equal to

A. 21 kV

B. '-21' kV

C. 39kV

D. -39 kV

Answer: B

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161. Twenty seven drops of mercury are charged simultaneously to the same potential of 10V. What will be the potential if all the charge drops are made to combine to form one large drop? Assume the drops to be spherical.

A. 90

B. 40

C. 160

D. 10

Answer: A

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162. Two charged spheres of radii R_1 and R_2 having equal surface charge density. The ratio of their potential is

A. $\frac{R_1}{R_2}$

B. $\frac{R_2}{R_1}$

C. $\left(\frac{R_1}{R_2}\right)^2$

D. $\left(\frac{R_2}{R_1}\right)^2$

Answer: A

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163. Four electric charges $+q, +q, -q$ and $-q$ are placed at the corners of a square of side $2L$. The electric potential at point A, midway between the two charges $+q$ and $+q$ is

A. Zero

B. $\left(\frac{1}{4}\pi\varepsilon_0\right)\left(2\frac{q}{L}\right)(1+\sqrt{5})$

C. $\frac{1}{4}\pi\varepsilon_0\Bigg)\left(2\frac{q}{L}\right)\left(1+\left(\frac{1}{\sqrt{5}}\right)\right)$

D. $\left(\frac{1}{4}\pi\varepsilon_0\right)\left(2\frac{q}{L}\right)\left(1-\left(\frac{1}{\sqrt{5}}\right)\right)$

Answer: D

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164. Equipotential surfaces associated with an electric field which is increasing in magnitude along the x-direction are

A. Planes parallel to xz planes

B. Planes parallel to xy planes

C. Planes parallel to yz planes

D. Coaxial cylinders of increasing radii the x axis

Answer: C

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165. A regular hexagon of side a has a charge Q at each vertex. Potential at the centres of hexagon is (k= $\left(\frac{1}{4}\pi\varepsilon_0\right)$)

A. Zero

B. $k\frac{Q}{a}$

C. $12\frac{kQ}{a}$

D. $6\frac{kQ}{a}$

Answer: D

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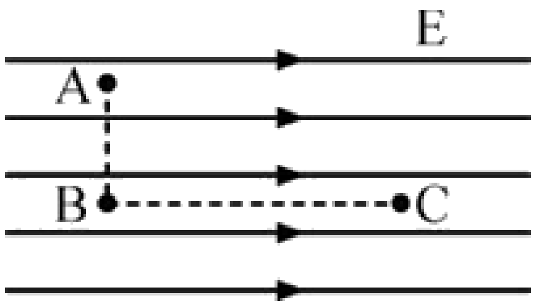
166. Figure shows three points A, B and C in a region of uniform electric field $\vec{E}$. The line AB is perpendicular and BC is parallel to the field lines. Then which of the following holds good?



where and represent the electric potential at the points A, B and C respectively

A. $V_A = V_B = V_C$

B. $V_A = V_B > V_C$

C. $V_A = V_B < V_C$

D. $V_A > V_B = V_C$

Answer: B

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167. Two thin wire rings each having radius R are placed at distance d apart with their axes coinciding. The charges on the two are $+Q$

and $-Q$. The potential difference between the centre so the two rings is

A. Zero

B. $\left(\frac{q}{4}\pi\varepsilon_0\right)\left\{\left(\frac{1}{R}\right)-\left(\frac{1}{\sqrt{R^2+d^2}}\right)\right\}$

C. $q\frac{R}{4}\pi\varepsilon_0 d^2$

D. $\left(\frac{q}{2}\pi\varepsilon_0\right)\left\{\left(\frac{1}{R}\right)-\left(\frac{1}{\sqrt{R^2+d^2}}\right)\right\}$

Answer: D

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168. The work done to move a charge along an equipotential from A to B

A. Cannot be defined as $\int_A^B \overrightarrow{E} . d\overrightarrow{I}$

B. Must be defined as $\int_A^B \overrightarrow{E} . d\overrightarrow{I}$

C. Zero

D. Can have a non zero value

Answer: C

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169. Equipotentials at a great distance from a collection of charges whose total sum is not zero are approximately.

A. Spheres

B. Planes parallel to xy planes

C. Paraboloids

D. Elipsoids

Answer: A

Watch Video Solution

170. Figure shows ome equipotential lines distributed in space. A charged object is moved from point A to point B.

A. The wor done in Fig. (i) is the greatest

B. The work done in Fig. (ii) is least

C. The work done is the sme in Fig. (i), Fig. (ii) and Fig. (iii)

D. The work done in Fig. (iii) is greater than Fig. (ii) but equal to that in Fig (i)

Answer: C

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171. When the separation between two charges is increase the electric potential energy of the charges.

A. Increases

B. Decreases

C. Remain the same

D. May increase or decrease

Answer: D

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172. Mark the correct statement :.

A. A solid conducting sphere holds more charge than a hallow conducting sphere of the same radius

B. Two equipotential surface mat intersects

C. When a conductor is earthed, charge always flows from conductor to earth

D. No work is done in taking a possitive charge from one point to another point inside a negetively charged metallic sphere

Answer: D

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173. A negetive charge is moved by an external agent in the direction of electric field. Then

A. Possitive work is done by the electric field

B. Potential energy of the charge increases

C. Potential energy of the charge decreases

D. Both (1) and (2)

Answer: B

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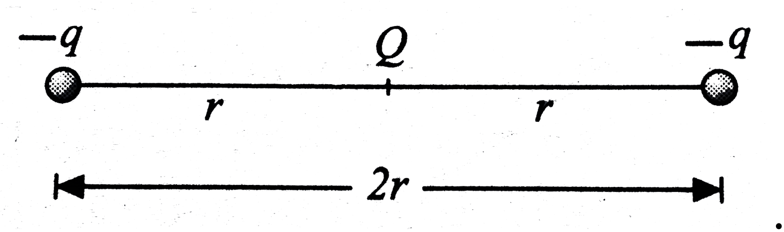
174. Charges $-q$, Q, and $-q$ are placed at an equal distance on a straight liner. If the total potential energy of the system of three charges is zero, then find the ratio Q/q.



A. $\frac{1}{2}$

B. $\frac{1}{4}$

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

D. $\frac{3}{4}$

Answer: B

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175. An alpha particle is accelerated from rest through a potential difference of 100 volt. Its final kinetic energy is

A. 100 eV

B. 1000 eV

C. 200 eV

D. 400 eV

Answer: C

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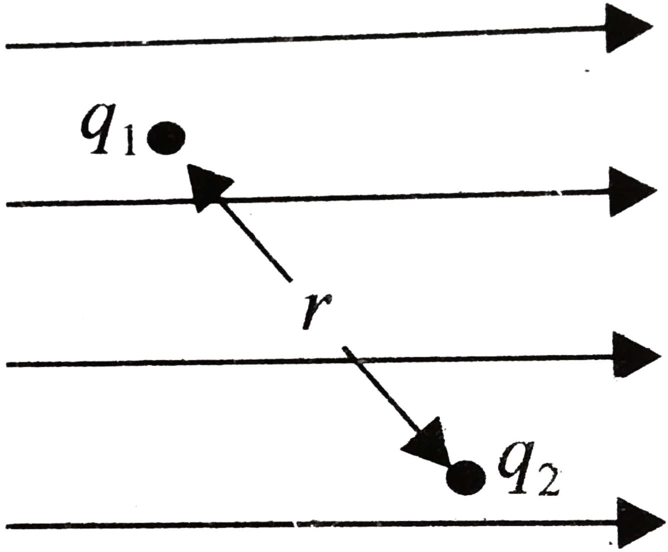
176. Two point charges q_1 and q_2 are placed in an external uniform electric field as shown in figure. The potential at the location of q_1 and q_2 are V_1 and V_2, i.e., V_1 and V_2 are potentials at location of q_1 and q_2 due to external unspecified charges only. Then electric potential energy for this configuration of two charged particle is



A. $q_1V_1 + q_2V_2$

B. $\frac{q_1V_1 + q_2V_2}{2}$

C. $\left(q_1V_1 + q_2V_2 + \left(q_1\frac{q_2}{4}\pi\varepsilon_0 r\right)\right.$

D. $q_1\frac{q_2}{4}\pi\varepsilon_0 r$

Answer: C

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177. Just outside a sharp point on a conductor we will have a larger _______________ than just outside gradually curving places on the conductor.

A. Electric field

B. Potential

C. Both (1) and (2)

D. None of these

Answer: A

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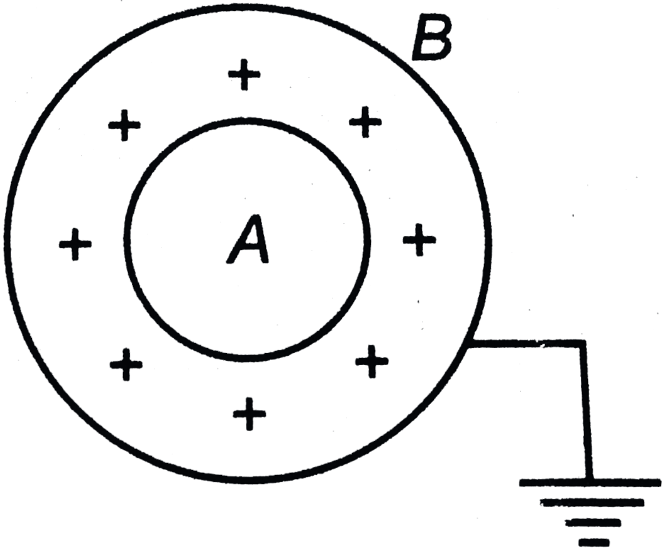
178. A and B are two concentric spherical shells. If A is given a charge $+q$ while B is earthed as shown in figure then



A. The charge on the outer surface of shell

Q is zero

B. The charge on Q is equal and opposite

to that of P

C. The field P is zero

D. All of these

Answer: D

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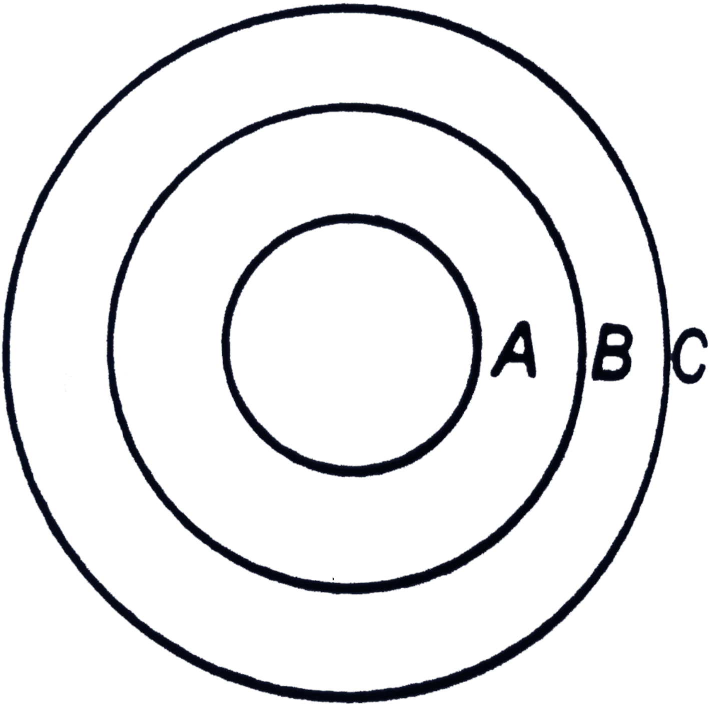
179. Charges $Q, 2Q,$ and $-Q$ are given to three concentric conducting sphereical shells A, B and C respectively as shown in figure. The ratio of charge on the inner and outer surface of shell C will be



A. $3:3$

B. $2:3$

C. $3:2$

D. $2:2$

Answer: C

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180. Two parallel metallic pltes , each of tharea A are kept as shown in the figure and charges -2Q and 4Q are given to them. Edge effects are negligeble . The charges on the surface I and III are respectively

A. $-2Q, \ +2Q$

B. $-Q, \ +3Q$

C. $+Q, \ +3Q$

D. $+2Q, \ -3Q$

Answer: C

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181. A particle of mass m and charge -q circulates around a fixed charge q in a circle radius under electrostatic force. The total energy of the system is (k= $\left(\frac{1}{4}\pi\varepsilon_0\right)$)

A. $-\frac{Kq^2}{2r}$

B. $\frac{Kq^2}{r}$

C. $-\frac{Kq^2}{r}$

D. Zero

Answer: A

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182. The work in rotating electric dipole of dipole moment p in an electric field E through an angle θ from the direction of electric field, is:

A. $-PE\cos\theta$

B. $PE\cos\theta$

C. $PE(1-\cos\theta)$

D. $-PE(1+\cos\theta)$

Answer: C

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183. A solid conducting sphere of radius 10 cm is enclosed by a thin metallic shell of radius 20 cm. A charge $q = 20\mu C$ is given to the inner sphere. Find the heat generated in the process, the inner sphere is connected to the shell by a conducting wire.

A. 12 J

B. 9 J

C. 24 J

D. Zero

Answer: B

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184. Two particles X and Y, of equal masses and with unequal positive charges, are free to move and are initially far away from each other. With Y at rest, X begins to move towards it with initial velocity u. After a long time, finally:

A. If Y is fixed , bith P and E are conserved

B. If Y is fixed, E is conserved nut p is not conserved

C. If both are free to move , P is conserved but E is not conserved

D. If both are free , E is conserved , but P is not conserved

Answer: B

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185. For the situation in figure mark the correct statement

A. Potential of the conductor is $\frac{q}{4\pi\varepsilon_0 d}$

B. Potential of the conductor is $\frac{q}{4\pi\varepsilon_0(d+R)}$

C. Potential at point B due to the induced charges is '-qR/(4piepsilon_0 (d+R))'

D. Both (2) and (3)

Answer: D

186. The capacity of parallel plate capacitor depends on

A. The speration between the plates

B. The potential applied across the plates

C. The amount of charge

D. Both (2) and (3)

Answer: A

187. A parallel plate capacitor (without dielectric) is charged by a battery and kept connected to the battery. A dielectric salb of dielectric constant $'k'$ is inserted between the plates fully occupying the space between the plates. The energy density of electric field between the plates will:

A. Increase K^2 times

B. Decreases K^2 times

C. Increase K times

D. Decrease K times

Answer: C

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188. A capacitor of capacitance C is charged to a potential V. The flux of the electric field through a closed surface enclosing the capacitor is

A. $C\frac{V}{\varepsilon_0}$

B. $2C\frac{V}{\varepsilon_0}$

C. $C\frac{V}{2}\varepsilon_0$

D. Zero

Answer: D

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189. If n drops, each of capacitance C and charged to a potential V, coalesce to form a big drop, the ratio of the energy stored in the big drop to that in each small drop will be

A. $n : 1$

B. $n^{\frac{1}{3}} : 1$

C. $n^{\frac{5}{3}} : 1$

D. $n^2 : 1$

Answer: C

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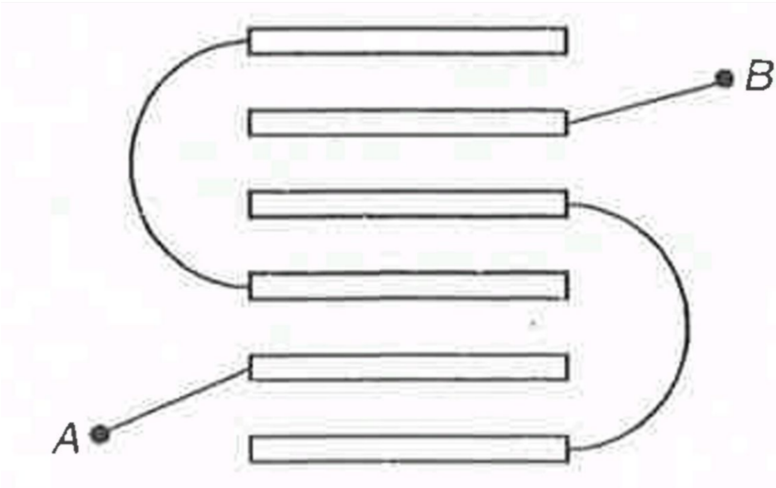
190. Plates of area A are arranged as shown. The distance between each plate is d , the net capacitance is



A. $\frac{\varepsilon_0 A}{2} d$

B. $\frac{5\varepsilon_0 A}{2} d$

C. $\frac{6\varepsilon_0 A}{2} d$

D. $\frac{\varepsilon_0 A}{d}$

Answer: D

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191. The' distance between the plates of a parallel plate capacitor is d. A metal plate of thickness $d/2$ is placed between the plates. What will e its effect on the capacitance.

A. Remain sme

B. become double

C. become half

D. become one forth

Answer: B

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192. If 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

A. Low K and low k

B. Low K and high k

C. High K and low k

D. High K and High k

Answer: D

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193. Which of the following methods will reduce the capacitance of a parallel plate capacitor ?

A. Converting another capacitor in series with this

B. Reducing the potential difference between the plates

C. Introducing a dielectric slab between the plates

D. Introducing a metal pltes of suitable thickness

Answer: A

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194. A slab of copper of thickness y is inserted between the plates of parallel plate capacitor as shown in figure. The separation between the plates is d. If $y = \frac{d}{4}$, then the ratio of capacitance of the capacitor after nd before inserting the slab is

A. $\sqrt{2} : 1$

B. $4 : 3$

C. $1 : 1$

D. $4 : 2$

Answer: B

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195. A parallel plate capacitor is filled with a uniform dielectric , maximum charge that can be given to it does not depends upon

A. Dielectric constant of the dielectric

B. Dielectric strenth of the dielectric

C. Separtion between the plates

D. Area of the plates

Answer: C

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196. Two spherical conductor A and B of radii a and b $(b > a)$ are placed concentrically in air. The two are connected by a copper wire as shown in figure. The equivalent capacitance of the system is

A. $\dfrac{4\pi\varepsilon_0 ab}{b-a}$

B. $4\pi\varepsilon_0(a+b)$

C. $4\pi\varepsilon_0 b$

D. $4\pi\varepsilon_0 a$

Answer: C

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197. The capacity of an isolated sphere is increased n times when it is enclosed by an earthed concentric sphere. The ratio of their radii is

A. $\frac{n^2}{n-1}$

B. ' $\frac{n}{n-1}$

C. $2\frac{n}{n+1}$

D. $\frac{2n+1}{n+1}$

Answer: B

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198. The capacitance of capacitor of plate areas A_1 and A_2 $(A_1 < A_2$ at a distance d is

A. $\frac{\varepsilon_0 A_1}{d}$

B. $\frac{\varepsilon_0 A_2}{d}$

C. $\left(\varepsilon_0 \frac{A_1 + A_2}{d}\right.$

D. $\left(\varepsilon_0 \frac{\sqrt{A_1 A_2}}{d}\right.$

Answer: A

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199. Consider the following four arrangement of spherical shell of radius a and b (a<. Then which of the following holds good for the value of their capacitances?

A. $C_3 > C_2 > C_1 = C_4$

B. $C_3 > C_1 = C_4 > C_2$

C. $C_2 > C_3 > C_1 > C_4$

D. $C_2 > C_1 = C_4 > C_3$

Answer: B

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200. 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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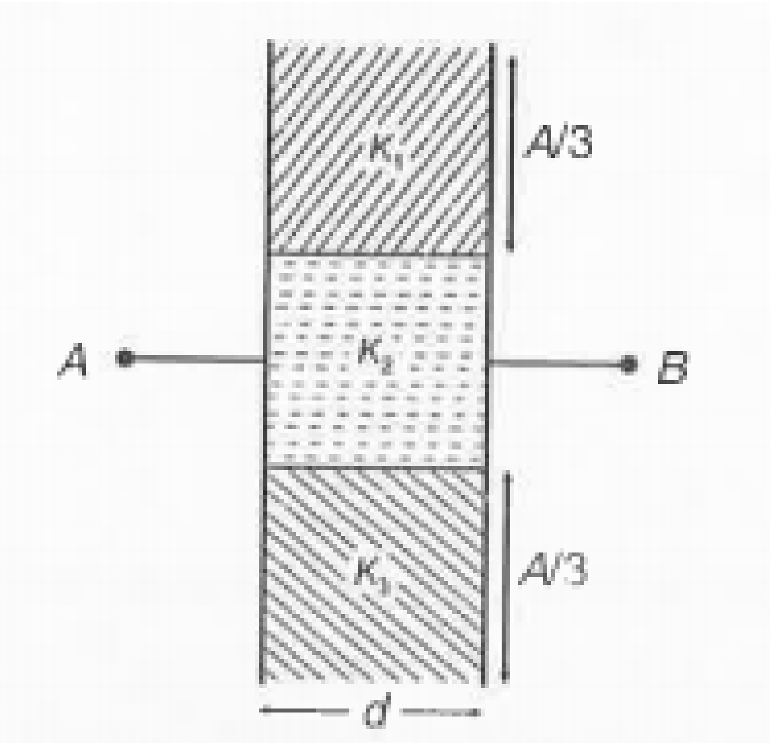
201. A parallel plate capacitor of plate area A and separation d filled with three dielectric materials as show in figure. The dielectric constants are K_1, K_2 and K_3 respectively. The capacitance across AB will be :



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

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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202. 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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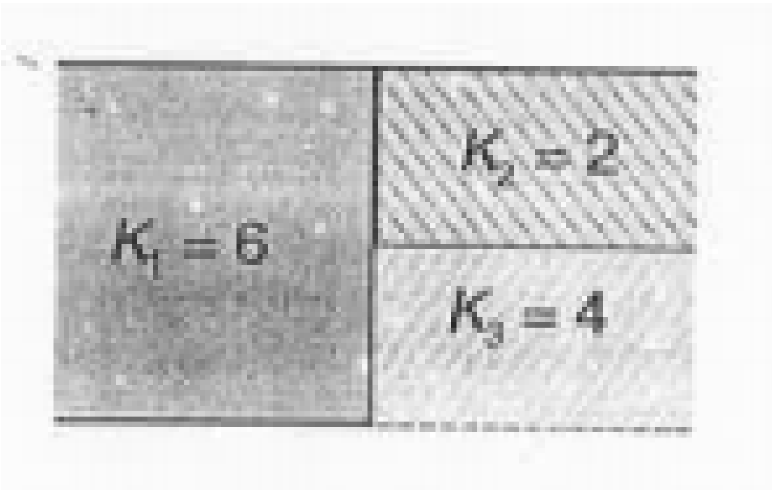
203. A parallel plate capacitor of capacitance C (without dielectric) is filled by dielectric slabs as shown in figure. Then the new capacitance of the capacitor is



A. 5 C

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

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

D. 2.4 C

Answer: B

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204. 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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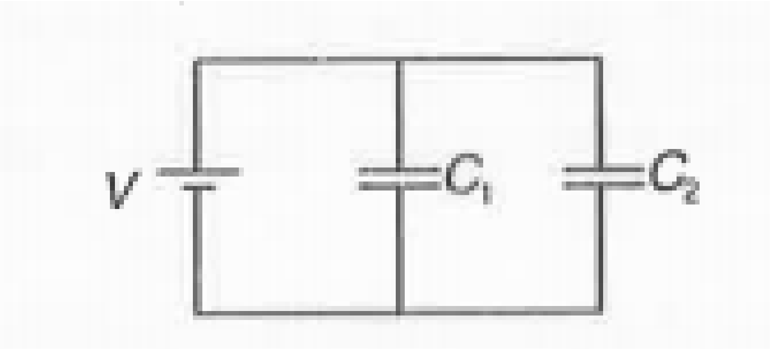
205. Two capacitors C_1 and C_2 of capacitances $\frac{C}{2}$ and $\frac{C}{4}$ are connected to a V volt battery, as shown in figure. The ratio of energy slored in capacitors C_1 and C_2 is



A. 1 :1`

B. 1 : 2 `

C. 2 : 1 `

D. 2 : 3`

Answer: C

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206. 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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207. 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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208. 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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209. 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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210. 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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211. 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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212. 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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213. 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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214. 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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215. 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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216. 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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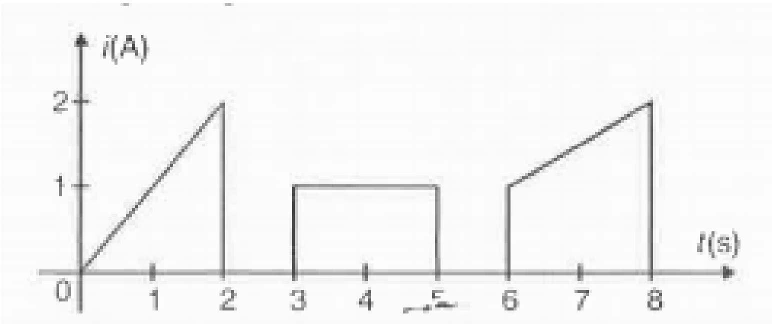
217. The plot represents the flow of current through a wire at three different times. The ratio of charges flowing through the wire at different time is



A. 2 : 1 : 2`

B. 1 : 1 : 1`

C. 1 : 3 : 3`

D. 2 : 2 : 3`

Answer: D

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218. 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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219. 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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220. 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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221. 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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222. 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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223. 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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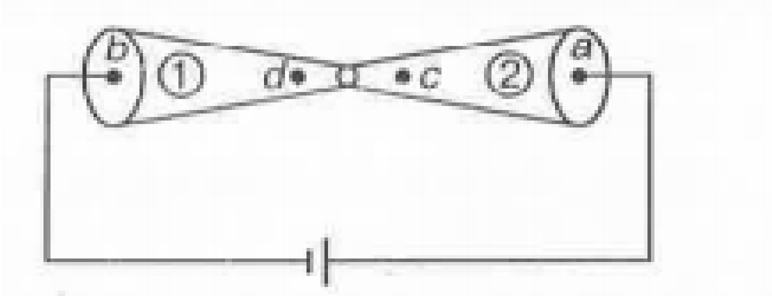
224. Two conductors of equal volumes having non-uniform cross-section are joined as show in figure. The number density of free electrons is more in conductor 2. As current passes through the system. Which of the following option is correct ?



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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225. 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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226. 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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227. In a balanced Wheatstone bridge, current in the galvanometer is zero. It remains zero when :

[P] battery emf is increased [Q] All resistances are increased by 10 ohms [R] all resistances are made five times [S] the battery and the galvanometer are interchanged

A. Battery emf is increase

B. The attery and the galvanometer are interchanged

C. All resistance are made five time

D. All of these

Answer: D

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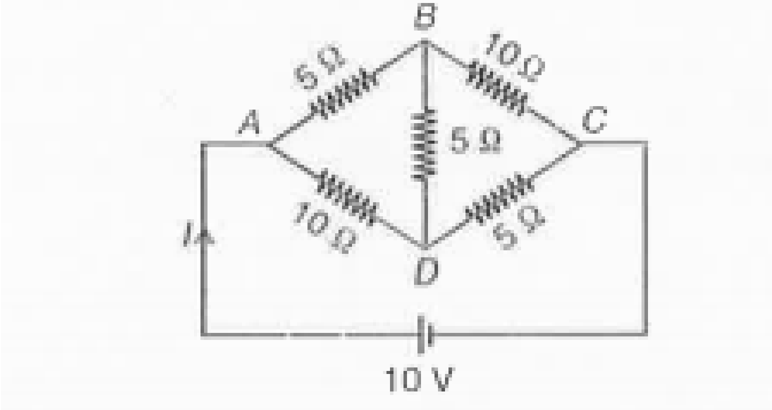
228. In the circuit shown in figure, the current I in circuit is



A. $\dfrac{10}{15}A$

B. $\dfrac{7}{10}A$

C. $\dfrac{10}{7}A$

D. $\dfrac{10}{7.5}A$

Answer: C

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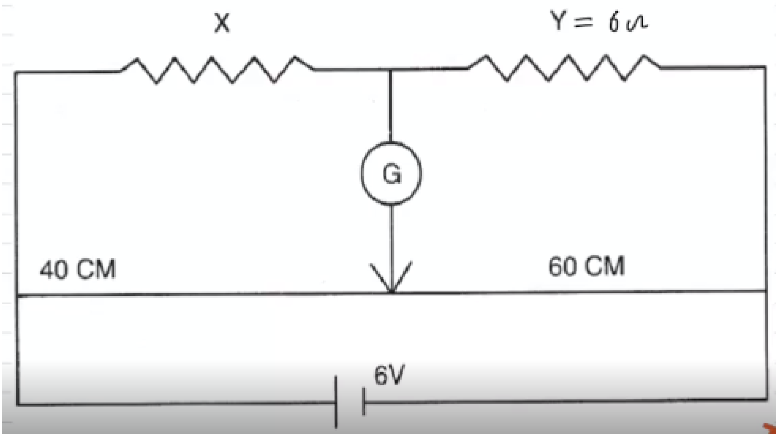
229. In the given circuit a meter bridge is shown in balanced state. The value of X is



A. 2Ω

B. 6Ω

C. 4Ω

D. 3Ω

Answer: C

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230. In above question if resistance of meter bridge wire is $1\ \Omega$ /cm then the value of current I is

A. 0.11 A

B. 0.33 A

C. 0.66 A

D. 3.3 A

Answer: C

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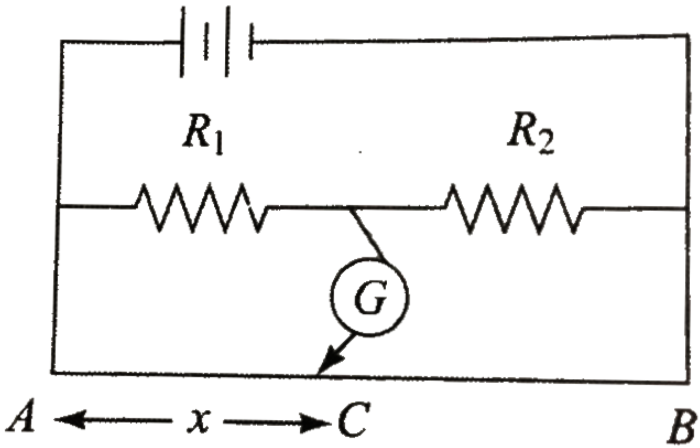
231. In the shows arrangement of a meter bridge, if AC corresponding to null deflection of galvanometer is x, what would be its value if the radius of the wire AB is doubled?



A. x/4`

B. 2x

C. 4x

D. x

Answer: D

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232. If in an experminal of wheastone bridge, the position of cells and galvanomter are inerchanged, then the balance points will

A. Change

B. Remain unchanged

C. Depend on the internal resistance of the cell

D. Depend on the resistance of the galvanometer

Answer: B

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233. The figure shows a meter bridge wire AC having unifrom area o cross-section. X is a standard resistance of 4Ω and Y is a resistance coil. When Y is immersed in melting ice the null point is at 40 cm from point A. when the coil Y is heated to 100° C, a resistance of 100Ω has to be connected in parallel with Y, in order to kkep the bridge balanced at the sam point. The temperature coefficient of resistance of coil is

A. $5 \cdot 10^{-3} / ^{\circ} C$

B. $2.3 \cdot 10^{-4} / ^{\circ} C$

C. $6.3 \cdot 10^{-4} / ^{\circ} C$

D. $3 \cdot 10^{-4} / ^{\circ} C$

Answer: C

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234. In a potentiometer experiment, the balancing with a cell is at length 240 cm. On shunting the cell with a resistance of 2Ω, the balancing becomes 120 cm. The internal resistance of the cell is

A. 1Ω

B. 0.5Ω

C. 4Ω

D. 2Ω

Answer: D

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235. The current in the primary circuit of a potentiometer is $0.2A$. The specific resistance and cross-section of the potentiometer wire are 4×10^{-7} ohm meter and $8 \times 10^{-7} m^2$ respectively. The potential gradient will be equal to -

A. $0.2v / m$

B. $1v/m$

C. $0.5v/m$

D. $0.1v/m$

Answer: D

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236. The length of a wire of a potentiometer is 100 cm, and the emf of its cell is E volt. It is employed to measure the emf of a battery whose internal resistance is 0.5Ω. If the balance point is obtained at l = 30 cm from the positive end, the emf of the battery is

A. $\frac{30E}{100.5}$

B. $\frac{30E}{100 - 0.5}$

C. $\frac{30(E - 0.5i)}{100}$, where I is the current in the potentiometer wire

D. $\frac{30E}{100}$

Answer: D

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237. In the figure the potentiometer wire AB of length L and resistance 9 r is joined to the cell D of e.m.f ε and internal resistance r. The emf of cell C is $\frac{\varepsilon}{2}$ and its internal resistance is 2r.The galvanometer G will show on deflection when the length AJ is

A. $\frac{4L}{9}$

B. $\frac{5L}{9}$

C. $\frac{7L}{18}$

D. $\frac{11L}{18}$

Answer: B

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238. Potentiometer is superior to voltmeter because

A. Uses a long wire

B. Works on the principle of wheatstone bridge

C. Does not disturb the potential difference under measurement

D. Uses a battery of larger emf in the main circuit

Answer: C

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239. The figure shows a potentiometer arrangement. D is the driving cell, C is the cell whose emf is to be determined. AB is the potentiometer wire and G is a galvanometer. J is a sliding contact which can touch any point on AB. Which of the following are essen tal condition for obtaining balance?

A. The emf of D must be greater than the emf of C

B. The positive terminals of D and C both must be joined to A

C. The galvanometer must show zero reading

D. All of these

Answer: D

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240. A charge $+Q$ is moving upwards vertically. It enters a magnetic field directed to the north. The force on the charge will be towards

A. North

B. South

C. East

D. West

Answer: D

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241. If an electron enters a magnetic field with its velocity pointing in the same direction as the magnetic field, then

A. The electron will turn to its right

B. The electron will turn to its left

C. The velocity of the electron will increase

D. The velocity of the electron will remain unchahged

Answer: D

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242. When a charged particle enters ina uniform magnetic field then its kinetic energy

A. Remains constant

B. Increases

C. Decreases

D. Becomes zero

Answer: A

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243. If a charged particle is moving in a plane perpendicular to a uniform magnetic field with a time period T Then

A. Its momentum changes but kinetic energy remains the same

B. Both momentum and kinetic energy remain the same

C. Both will change

D. Kinetic energy change but momentum remains the same

Answer: A

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244. In a magnetic field $\overrightarrow{B} = \hat{i} + y\hat{j} + 3\hat{k}$ a charge particle (q, m) is moving with velocity $\overrightarrow{V} = 2\hat{i} + 3\hat{j} + z\hat{k}$ experiences a force $\overrightarrow{F} = -\hat{i} + 2\hat{j} + \hat{k}$. The value of y and z may be

A. y=4, z=2

B. y=2, z=4

C. y=3, z=6

D. y=6, z=3

Answer: B

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245. If a chraged particle at rest experiences no electromagnetic force,

(i) the electric field must be zero

(ii) the magnetic field must be zero

(iii) the electric field may or may not be zero

(iv) the magnetic field may or may not be zero

A. The electric field must be zero

B. The magnetic field must be zero

C. The electric field may or may not be zero

D. All of these

Answer: A

Watch Video Solution

246. An electron is moving along the positive x-axis . A uniform electric field exists towards negative y-axis. What should be the direction of a magnetic field of suuitablw magnitude so the net force on electron is zero ?

A. Positive z-axis

B. Negative z-axis

C. Positive y-axis

D. Negative y-axis

Answer: B

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247. A charged particle has acceleration $\overrightarrow{a} = 2\hat{i} + x\hat{j}$ in a magnetic field $\overrightarrow{B} = -3\hat{i} + 2\hat{j} - 4\hat{k}$.Find the value of x.

A. 4

B. 2

C. 6

D. 3

Answer: D

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248. The force $\overrightarrow{F}$ experienced by a particle of charge q moving with a velocity $\overrightarrow{v}$ in a magnetic field $\overrightarrow{B}$ is given by

$\vec{F} = q\left(\vec{v} \times \vec{B}\right)$. Which pairs of vectors are at right angles to each other?

A. $\overline{F}$ and $\overline{V}$

B. $\overline{F}$ and $(\overline{V} \cdot \overline{B})$

C. $\overline{F}$ and $\overline{B}$

D. Both (1) & (3)

Answer: D

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249. If a proton is projected in a direction perpendicular to a uniform magnetic field with velocity v and and electron is projected along the line of force, what will happen to proton and electron?

A. The electron will travel along a circle with constant speed and the proton will move along a straight line

B. Proton will move in a circle with constant speed and there will be no effect on the motion of electron

C. There will not be any effect on the motion of electron and proton

D. The electron and proton both will follow the path of a parabola

Answer: B

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250. An electron is moving along positive x-axis. To get it moving on an anticlockwise circular path in x-y plane, a magnetic field is applied

A. Along positive y-axis

B. Along positive z-axis

C. Along negative y-axis

D. Along negative z-axis

Answer: B

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251. Two particle X and Y having equal charge, after being accelerated through the same potential difference enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. The ratio of the mass of X to that of Y is

A. $\left(\frac{R_1}{R_2}\right)^{\frac{1}{2}}$

B. $\left(\frac{R_2}{R_1}\right)$

C. $\left(\frac{R_1}{R_2}\right)^2$

D. $\left(\frac{R_1}{R_2}\right)$

Answer: C

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252. An electron enters a region where magnetic field (B) and electric field (E) are mutually perpendicular, then

A. It will always move in the direction of B

B. It will alwas move in the direction of E

C. It always posses circular motion

D. It may go undeflected

Answer: D

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253. Lorentx force can be calculated by using the formula.

A. $\overline{F} = q\left[2\overline{E} + \left(\overline{B}\cdot\overline{V}\right)\right]$

B. $\overline{F} = q\left[\overline{E} - \left(\overline{V}\cdot\overline{B}\right)\right]$

C. $\overline{F} = q[\overline{E} - (\overline{V} . \overline{B})]$

D. $\overline{F} = q[\overline{E} + (\overline{V} \cdot \overline{B})]$

Answer: D

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254. H^{+}, He^{+} and O^{2+} ions having same kinetic energy pass through a region of space filled with uniform magnetic field B directed perpendicular to the velocity of ions. The masses of the ions

H^+, He^+ and O^{2+} are respectively, in the ratio $1:4:16$. As a result

A. O^{++} will be deflect most

B. H^+ will be deflected most

C. He^+ and O^{++} will be deflected most

D. All will be deflected equally

Answer: B

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255. A charged particle goes undeflected in a region containing electric and magnetic field. It is possible that

A. $\overline{V}| \, |\overline{B}$ and $\overline{E}$ is not parallel to $berB$

B. $\overline{E}| \, |\overline{B}$ but $berV$ is not parallel to $\overline{E}$

C. $\overline{E}| \, |\overline{B}$,$\overline{V}| \, |\overline{E}$

D. $\overline{E}| \, |\overline{B}$,$\overline{V} \perp \overline{E}$

Answer: C

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256. A particle is projected in a plane perpendicular to a uniform magnetic field. The area bounded by the path described by the particle is proportional to

A. The velocity

B. The momentum

C. The kinetic energy

D. All of these

Answer: C

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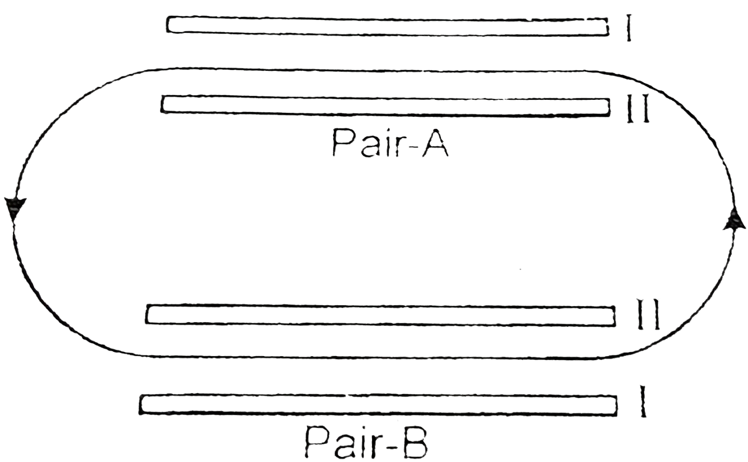
257. Figure shows the path of an electron in a region of uniform magnetic field. The path consists of two straight sections, each between a pair of uniformly charged plates and two half circles. The electric field exists only between the plates



A. Plate I of pair A is at lower potential than plate II of the same pair

B. Plate I of pair B is at lower potential than plate II of the same pair

C. Direction of the electric fields is into the page $[\otimes]$

D. Plate I of pair A is at higher potential than plate-II of the same pair

Answer: D

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258. In a region of space uniform electric field is present as $\overrightarrow{E} = E_0\hat{i}$ and uniform magnetci field is present as $\overrightarrow{B} = -B_0\hat{j}$. An electron is released from rest at origin. What is the path followed by electron after released. $(E_0 \& B_0$ are positive constants)

A. 

B. 

C. 

D.

Answer: C

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259. The magnetic field dB due to a small element at a distance r and carrying current i is

A. $\overline{dB} = \frac{\mu_0}{4\pi} i \left(\frac{\overline{dl} \times \bar{r}}{r} \right)$

B. $\overline{dB} = \frac{\mu_0}{4\pi} i^2 \left(\frac{\overline{dl} \times \bar{r}}{r} \right)$

C. $\overline{dB} = \frac{\mu_0}{4\pi} i \left(\frac{\overline{dl} \times \bar{r}}{r^2} \right)$

D. $\overline{dB} = \frac{\mu_0}{4\pi} i \left(\frac{\overline{dl} \times \bar{r}}{r^3} \right)$

Answer: D

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260. a very long straight wire carries a current I. at the instant when are charge -Q at point P has velocity v as shown in figure the force on the charge is 

A. opposite to OX

B. along OX

C. opposite to OY

D. along OY

Answer: C

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261. Two coils are having magnetic field B and 2B at their centres and current i and 2i then the ratio of their radius is

A. $1:2$

B. $2:1$

C. $1:1$

D. $4:1$

Answer: C

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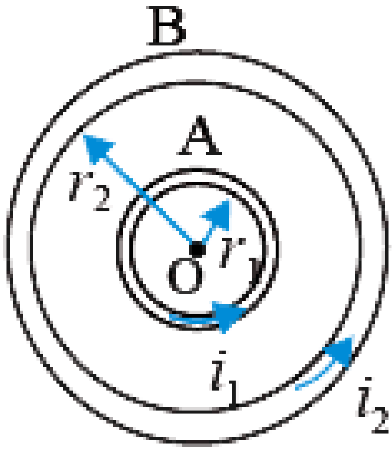
262. A and B are two concentric circular conductors of centre O and carrying currents i_1 and i_2 as shown in the figure. The ratio of their radii is $1:2$ and ratio of the flux densities at O due to A and B is $1:3$. The value of i_1 / i_2 will be :



A. $\frac{1}{6}$

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

Answer: A

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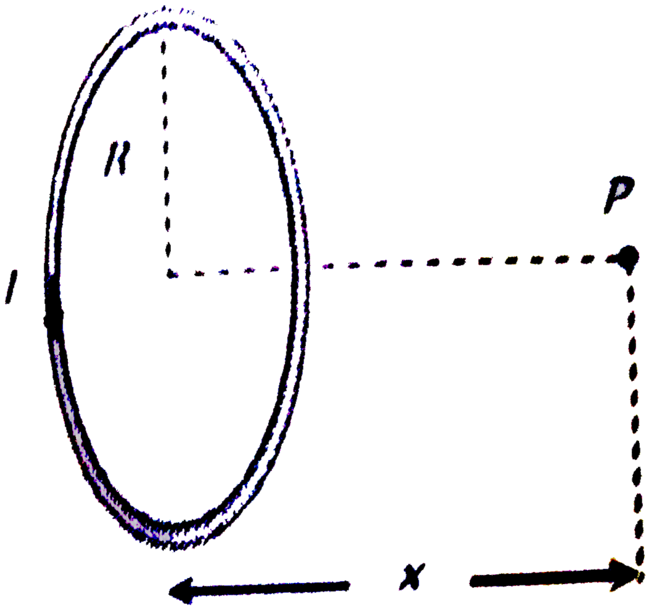
263. A coil having N turns carry a current I as shown in the figure. The magnetic field intensity at point P is



A. $\mu_0 NI \frac{R^2}{\left(R^2+x^2\right)^3} / 2$

B. $\mu_0 NI \frac{R^2}{\left(R^2+x^2\right)^1} / 2$

C. $\mu_0 NI \frac{R^2}{2} \frac{\left(R^2+x^2\right)^3}{2}$

D. $\mu_0 NI 2 \frac{R^2}{\left(R^2+x^2\right)^3} / 2$

Answer: C

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264. a vertical wall is in South north direction. a current carrying where is kept in the world such that to the west of the wall magnetic field due to wire is towards south then the wire where should be

A. vertical and current in downwards

B. horizontal and current is toward West

C. vertical and current in upward

D. horizontal and current is towards east

Answer: C

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265. The expression for magnetic induction inside a solenoid of length L carrying a current I and having N number of turns is

A. $\mu_0 \frac{n}{4} \pi l$

B. $\mu_0 \frac{l}{4} \pi n$

C. $\frac{\mu_0}{4} \pi n l$

D. $\mu_0 n l$

Answer: D

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266. The current on the winding of a toroid is 2 A. It has 400 turns and mean circumferential length is 40 cm. With the help of search coil and charge measuring instrument the magnetic field is found to be 1 T. The susceptibility is

A. 2000

B. 2500

C. 1000

D. 1500

Answer: B

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267. Two long parallel wires are at a distance 2d apart. They carry steady equal current flowing out of the plane of the paper as shown. The variation of the magnetic field along the line xx' is given by :

A.

B.

C.

D.

Answer: B

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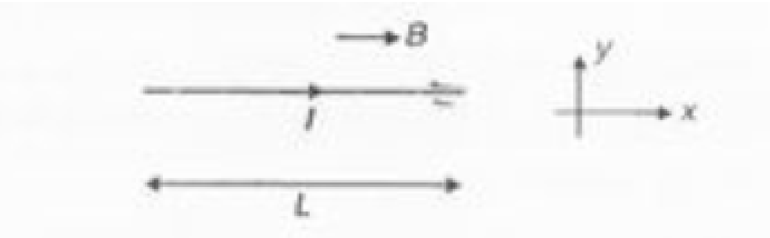
268. the force on current carrying wire placed in uniform magnetic field B as shown in figure is 

A. $BIL(-\hat{j})$

B. $BIL(\hat{j})$

C. $BIL(-\hat{i})$

D. Zero

Answer: D

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269. a straight wire current element is carrying current 100 A as shown in figure. the magnitude of magnetic field at a point P.

A. 5×10^{-3} T

B. 2.5×10^{-6} T

C. 0.8×10^{-5} T

D. 5×10^{-6} T

Answer: D

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270. A long thick conducting cylinder of radius 'R' carries a current uniformly distributed over its cross section :

A. the magnetic field strength is maximum on the surface

B. the strength of the magnetic field inside the conductor will vary as inversely proportional to r where r is the distance from the axis.

C. the strength of the magnetic field outside the conductor varies as inversely proportional to 1/r^2 where r is the distance from the axis

D. both (2) & (3)

Answer: A

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271. in given figure X and Y are two long straight parallel conductor each carrying a current 2 A. the force per unit length on each conductor is F. when the current in each is changed to 1 A and reversed in direction. the force per unit length on each is now

A. $\frac{F}{4}$ and unchanged in direction

B. $\frac{F}{2}$ and reversed in direction

C. $\frac{F}{2}$ and changed in direction

D. $\frac{F}{4}$ and reversed in direction

Answer: A

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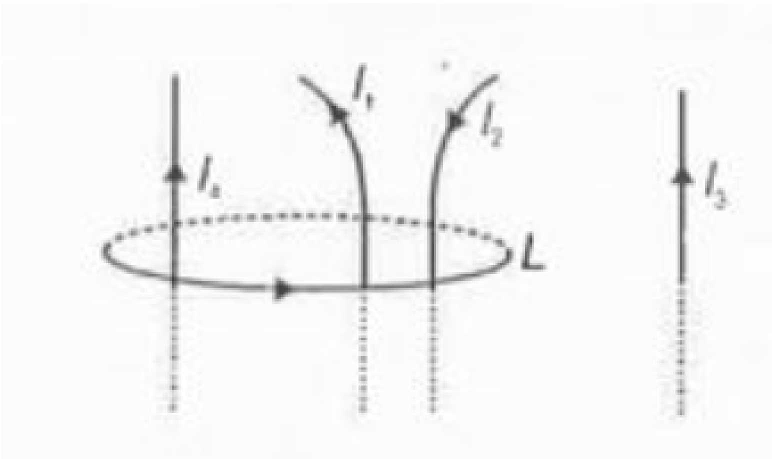
272. the value of $\oint \overline{B}.\,\overline{dl}$ for the loop L is



A. $\mu_0(l_1 + l_2 - l_4)$

B. $\mu_0(l_1 + l_2 - l_3 + l_4)$

C. $\mu_0(l_1 - l_2 + l_4)$

D. $\mu_0(l_1 + l_4 + l_3)$

Answer: C

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273. A current i flows along the length of an infinitely long, straight, thin-walled pipe. Then,

(a) the magnetic field at all points inside the pipe is the same, but not zero

(b) the magnetic field at any point inside the pipe is zero

(c) the magnetic field is zero only on the axis of the pipe

(d) the magnetic field is different at different points inside the pipe

A. the magnetic field at all points inside the pipe is the same but not zero

B. the magnetic field at any point inside the pipe is zero

C. the magnetic field is zero only on the axis of the pipe

D. the magnetic field is different at different points inside the pipe

Answer: B

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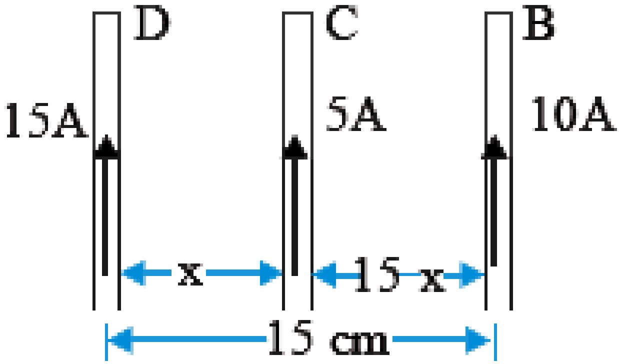
274. Three long, straight and parallel wires carrying currents are arranged as shown in the figure. The wire C which carries a current of 5.0 amp is so placed that it experiences no force. The distance of wire C from wire D is then



A. 9 cm

B. 7 cm

C. 5 cm

D. 3 cm

Answer: A

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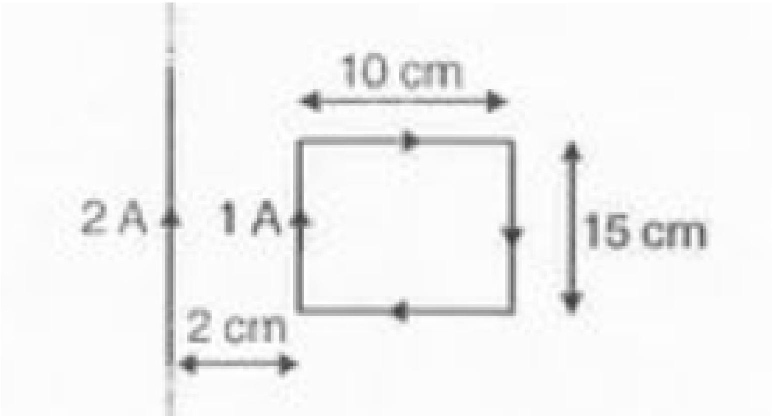
275. the net force on the loop is



A. 2.5×10^{-7} N away from wire

B. 37×10^{-7} N onwards wire

C. 25×10^{-7} N onwards wire

D. 3.7×10^{-7} N away from wire

Answer: C

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