PHYSICS

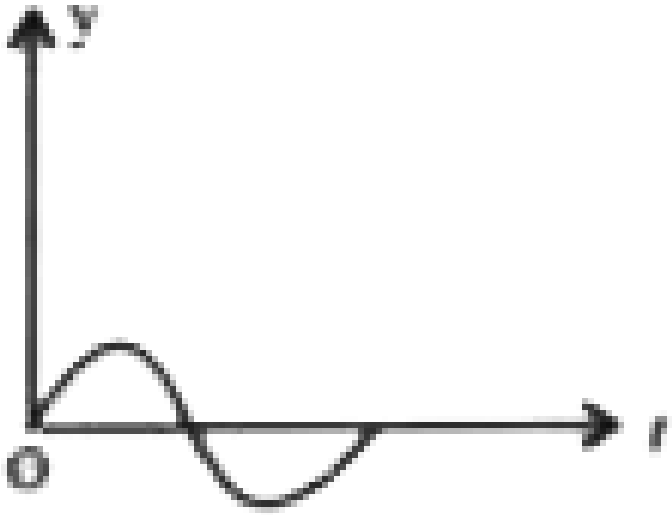
BOOKS - KCET PREVIOUS YEAR PAPERS

KARNATAKA CET 2003

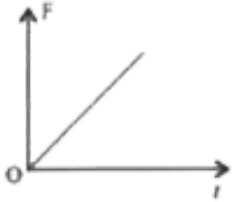
Physics

1. The displacement time graph of a particle executing SHM is as shown in the figure. The corresponding force-time graph of the particle

is-



A.



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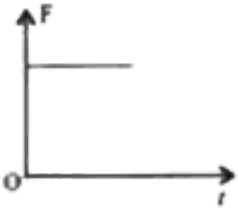
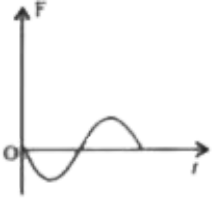
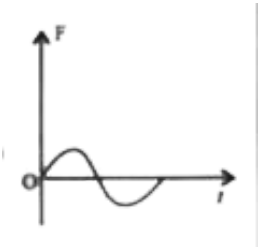


C. 

D. 

Answer: C

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2. Which of the following sets of concurrent forces may be in equilibrium ?

A. $F_1 = 3N, F_2 = 5N, F_3 = 1N$

B. $F_1 = 3N, F_2 = 5N, F_3 = 9N$

C. $F_1 = 3N, F_2 = 5N, F_3 = 6N$

D. $F_1 = 3N, F_2 = 5N, F_3 = 15\text{N}$

Answer: C

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3. Young's modulues of perfectly rigid body material is-

A. infinity

B. zero

C. $10 \times 10^{10} N/m^2$

D. $1 \times 10^{10} N/m^2$

Answer: A

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4. An ideal monoatomic gas at $27^\circ C$ is compressed adiabatically to $\frac{8}{27}$ times of its

present volume. The increase in temperature of the gas is

A. $375^\circ C$

B. $402^\circ C$

C. $175^\circ C$

D. $475^\circ C$

Answer: B

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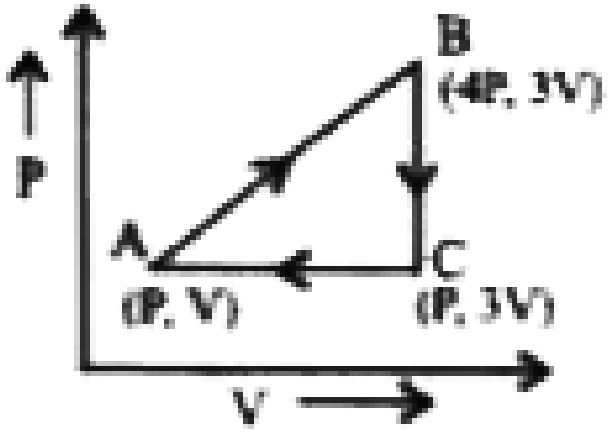
5. A sample of ideal monoatomic gas is taken round the cycle ABCA as shown in the figure. The work done during the cycle is



A. 3PV

B. Zero

C. 9PV

D. 6PV

Answer: A

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6. A charge q is placed at the centre of the line joining two equal charges Q. The system of three charges will be in equilibrium if q is equal to

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

B. $-\frac{Q}{2}$

C. $+\frac{Q}{2}$

D. $-\frac{Q}{4}$

Answer: D

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7. The inward and outward electric flux from a closed surface are respectively 8×10^3 and 4×10^3 units. Then the net charge inside the closed surface is

A. -4×10^3 coulomb

B. 4×10^3 coulomb

C. $\frac{-4 \times 10^3}{\varepsilon_0}$ coulomb

D. $-4 \times 10^3 \varepsilon_0$ coulomb

Answer: D

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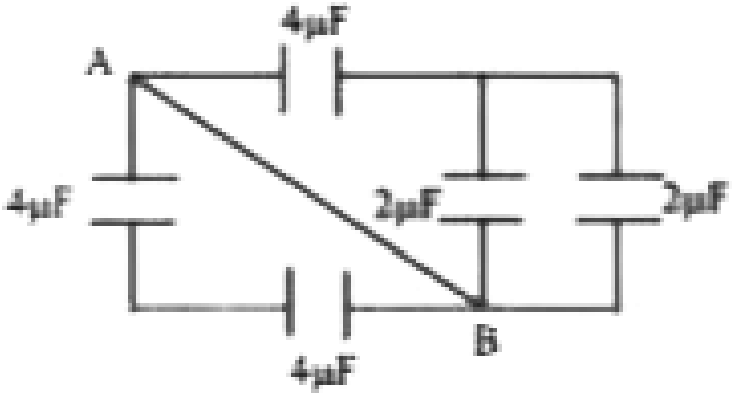
8. In the circuit as shown in the figure



The effective capacitance between A and B is

A. $2\mu F$

B. $3\mu F$

C. $8\mu F$

D. $4\mu F$.

Answer: D

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9. Capacitance of a parallel plate capacitor becomes $4/3$ times its original value if a dielectric slab of thickness $t = \frac{d}{2}$ is inserted between the plates [d is the separation between the plates]. The dielectric constant of the slab is

A. 4

B. 8

C. 2

D. 6

Answer: C

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10. A charged particle of mass m and charge q is released from rest in an uniform electric field $\vec{E}$. Neglecting the effect of gravity, the

kinetic energy of the charged particle after 't' second is

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

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

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

D. $\frac{E^2q^2t^2}{2m}$

Answer: D

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11. If a ray of light in a denser medium strikes a rarer medium at an angle of incidence i, the angle of reflection and refraction are respectively r and r', if the reflected and refracted rays are at right angles to each other, the critical angle for the given pair of media is

A. $\sin^{-1}(\tan r')$

B. $\sin^{-1}(\tan r)$

C. $\tan^{-1}(\sin i)$

D. $\cot^{-1}(\tan i)$

Answer: A

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12. Waves that can not be polarized are

A. electromagnetic waves

B. light waves

C. longitudinal waves

D. transverse wave

Answer: C

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13. The phenomenon of re-irradiation of absorbed light is called

A. kerr effect

B. Double refraction

C. Optical activity

D. Dichroism

Answer: C

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14. As a result of interference of two coherent sources of light, energy is

A. redistributed and the distribution does not vary with time

B. increased

C. redistributed and the distribution changes with time

D. decreased

Answer: A

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15. There are n_1 photons of frequency v_1 in a beam of light. In an equally energetic beam there are n_2 photons of frequency v_2. Then the correct relation is

A. $\frac{n_1}{n_2} = \frac{v_1}{v_2}$

B. $\frac{n_1}{n_2} = 1$

C. $\frac{n_1}{n_2} = \frac{v_1^2}{v_2^2}$

D. $\frac{n_1}{n_2} = \frac{v_2}{v_1}$

Answer: D

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16. A bucket full of hot water is kept in a room. It cools from $75^\circ C$ to $70^\circ C$ in t_1 minutes,

from $70^\circ C$ to $65^\circ C$ in t_2 minutes and from $65^\circ C$ to $60^\circ C$ in t_3 minutes. Then

A. $t_1 < t_2 < t_3$

B. $t_1 = t_2 = t_3$

C. $t_1 < t_2 > t_3$

D. $t_1 > t_2 > t_3$

Answer: A

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17. A fish, looking up through the water sees the outside world contained in a circular horizon. If the refractive index of water is 4/3 and the fish is 12 cm below the surace of water, the radius of the circle in centimere is

A. $\frac{12 \times 3}{\sqrt{5}}$

B. $12 \times 3 \times \sqrt{5}$

C. $\frac{12 \times 3}{\sqrt{7}}$

D. $12 \times 3 \times \sqrt{7}$

Answer: C

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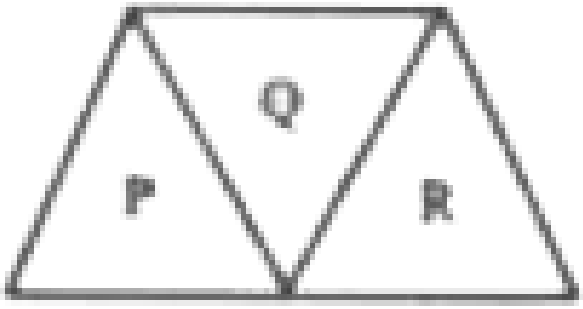
18.



A given ray of light suffers minimum deviation in an equilateral prism P. additonal prism Q and R of identical shape and material are now added to P, as shown in the figure. The ray will surffer

A. same deviation

B. greater deviation

C. total internal reflection

D. no deviation

Answer: A

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19. The aperture of the objective lens of a telescope is made large so as to

A. increase the resolving power of the telescope

B. increase the magnifying power of the telescope

C. to focus on distant objects

D. make image aberration less

Answer: A

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20. A lamp hanging 4 metres above the table is lowered by 1 metre. Illumination on the table

A. decreses by 25%

B. increases by 25%

C. decreases by 77.7%

D. increases by 77.7%

Answer: D

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21. Two wires of the same dimensions but resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is

A. $\frac{\rho_1 + \rho_2}{2}$

B. $\rho_1 + \rho_2$

C. $2(\rho_1 + \rho_2)$

D. $\sqrt{\rho_1 \rho_2}$

Answer: A

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22. If a 30 V, 90 W bulb is to be worked in 120 V line, the resistance to be connected in series with the bulb is

A. 20Ω

B. 10Ω

C. 40Ω

D. 30Ω

Answer: D

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23. The potential difference between the terminals of a cell in open circuit is 2.2 volt. With resistance of 5 ohm across the terminals of a cell, the terminal difference is 1.8 volt. The internal resistance of the cell is

A. $\frac{9}{10}$ ohm

B. $\frac{10}{9}$ ohm

C. $\frac{7}{12}$ ohm

D. $\frac{12}{7}$ ohm

Answer: B

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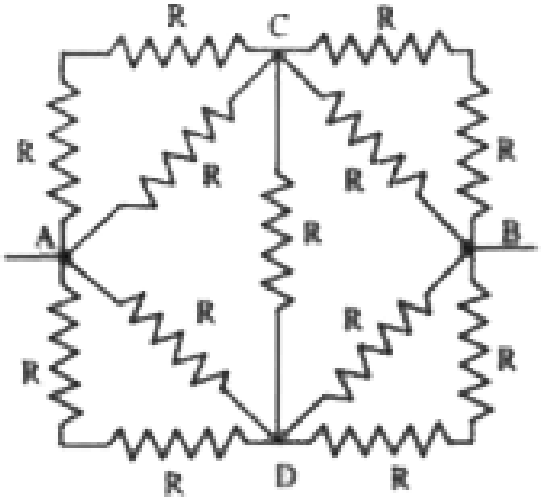
24.



24.

Thirteen resistances each of resistance R ohm are connected in the circuit as shown in the figure above. The effective resistance between A and B is

A. $\frac{4R}{3}\Omega$

B. $2R \quad \Omega$

C. $R\Omega$

D. $\frac{2R}{3}\Omega$

Answer: D

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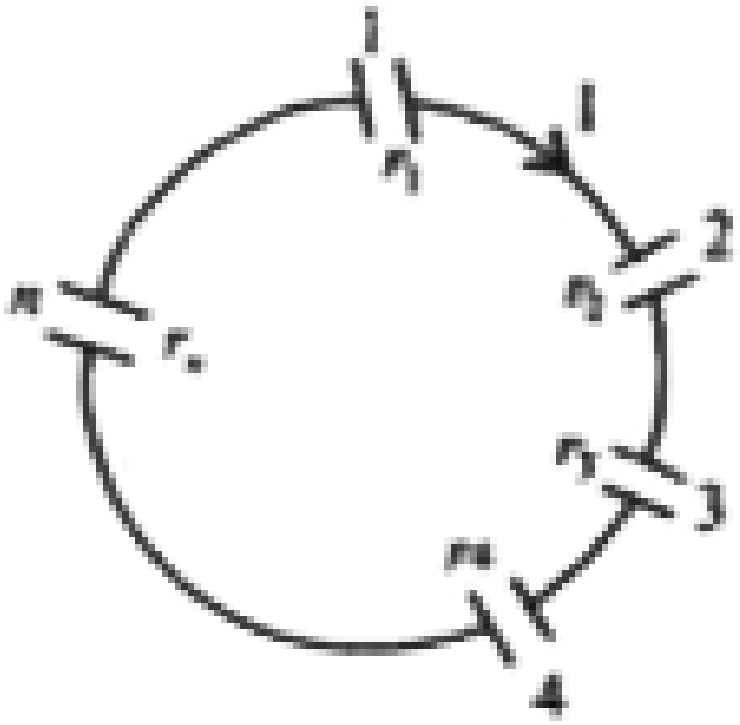

25.

A group of N cells whose e.m.f. varies directly with the internal resistance as per the equation $E_n = 1.5r_n$ are connected as shown in the figure above. The current I in the circuit is

A. 5.1 amp

B. 0.51 amp

C. 1.5 amp

D. 0.15 amp

Answer: C

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26. The dimensions of $\frac{a}{b}$ in the equation $P = \frac{a - t^2}{bx}$ where P is pressure, x is distance

and t is time are

A. M^2LT^{-3}

B. MT^{-2}

C. LT^{-3}

D. ML^3T^{-1}

Answer: B

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27. Three vectors satisfyi the relation $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} \cdot \vec{C} = 0$ then $\vec{A}$ is parallel to

A. $\vec{C}$

B. $\vec{B}$

C. $\vec{B} \times \vec{C}$

D. $\vec{B} \cdot \vec{C}$

Answer: C

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28. A student is standing at a distance of 50 metre from the bus. As soon as the bus begins its motion with an acceleration of $1m/s^2$, the student starts running towards the bus with a uniform velocity u. assuming the motion to be along a straight road, the minimum value of u. so that the student is able to catch the bus is

A. $8ms^{-1}$

B. $5ms^{-1}$

C. $12ms^{-1}$

D. $10ms^{-1}$

Answer: D

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29. For a given velocity, a projectile has the same range R for two angles of projection if t_1 and t_2 are the time of flight in the two cases then

A. $t_1 t_2 \propto R$

B. $t_1 t_2 \propto R^2$

C. $t_1 t_2 \propto \frac{1}{R^2}$

D. $t_1 t_2 \propto \frac{1}{R}$

Answer: A

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30. Weight of a body of mass m decreases by 1% when it is raised to height h above the earth's surface. If the body is taken to a depth h in a mine, charge in its weight is

A. 0.5% decrease

B. 2% decrease

C. 0.5% increase

D. 1% increase

Answer: A

31. The equation of a transverse wave travelling along positive x axis with amplitude

0.2 m, velocity 360m/sec and wave-length 60m can be written as

A. $y = 0.2 \sin \pi \left[6t + \frac{x}{60} \right]$

B. $y = 0.2 \sin \pi \left[6t - \frac{x}{60} \right]$

C. $y = 0.2 \sin 2\pi \left[6t - \frac{x}{60} \right]$

D. $y = 0.2 \sin 2\pi \left[6t + \frac{x}{60} \right]$

Answer: C

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32. If v_m is the velocity of sound in moist air, v_d is the velocity of sound in dry air, under identical conditions of pressure and temperature

A. $v_m < v_d$

B. $v_m > v_d$

C. $v_m v_d = 1$

D. $v_m = 1 v_d$

Answer: B

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33. if T is the reverberation time of an auditorium of volume V, then

A. $T \propto V^2$

B. $T \propto V$

C. $T \propto \frac{1}{V}$

D. $T \propto \frac{1}{V^2}$

Answer: B

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34. Two wires are fixed in a sonometer. Their tensions are in the ratio 8:1. the lengths are in the ratio 36:35. the diameters are in the ratio 4:1. densities of the materials are in the ratio 1:2. if the higher frequency in the setting is 360 Hz, the beat frequency when the two wires are sounded together is

A. 8

B. 5

C. 10

D. 6

Answer: C

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35. A sound source is moving towards stationary listener with $\frac{1}{10}th$ of the speed of sound. The ratio of apparent to real frequency is

A. $\left(\frac{9}{10}\right)^2$

B. $\frac{10}{9}$

C. $\frac{11}{10}$

D. $\left(\frac{11}{10}\right)^2$

Answer: B

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36. If v is the speed of sound in air then the shortest length of the closed pipe which resonates to a frequency n

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

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

C. $\frac{4n}{v}$

D. $\frac{2n}{v}$

Answer: B

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37. Cavitation is a special application property exhibited only by

A. ultrasonics

B. electromagnetic waves

C. audible sound

D. infrasonics

Answer: B

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38. In Young's double slit experiment, the fringe width is β. If the entire arrangement is

placed in a liquid of refractive index n, the fringe width becomes

A. $n\beta$

B. $\frac{\beta}{n+1}$

C. $\frac{\beta}{n-1}$

D. $\frac{\beta}{n}$

Answer: D

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39. Yellow light is used in signel slit diffraction experiment with slit width 0.6 mm. if yellow light is replaced by X-rays then the pattern will reveal that

A. no diffraction pattern

B. that the central maxima narrower

C. less number of fringes

D. more number of fringes.

Answer: A

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40. In an interference exeperiment, third bright fringe is obtained at a point on the screen with a light of 700 nm. What should be the wavelength of the light source in order to obtain 5th bright fringe at the same point?

A. 630nm

B. 500nm

C. 420nm

D. 750nm

Answer: C

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41. A particle of mass M at rest decays into two masses m_1 and m_2 with non zero velocities. The ratio of de-Broglie wavelengths of the particles $\frac{\lambda_1}{\lambda_2}$ is

A. $\frac{m_2}{m_1}$

B. $\frac{m_1}{m_2}$

C. $\frac{\sqrt{m_1}}{\sqrt{m_2}}$

D. $1:1$

Answer: D

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42. For an electron in the second orbit of Bohr Hydrogen atom, the moment of linear momentum is

A. πh

B. $2\pi h$

C. $\frac{h}{\pi}$

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

Answer: C

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43. If elements with principal quantum number $n > 4$ were not allowed in nature, the number of possible elements would have been

A. 32

B. 60

C. 64

D. 4

Answer: B

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44. In photoelectric effect, the number of electrons ejected per second is

A. proportional to the wavelength of light

B. proportional to the intensity of light

C. proportional to the work function of the metal

D. proportional to the frequency of light

Answer: B

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45. Half-life of a radioactive substance is 20 minutes. The time between 20% and 80% decay will be

A. 40 minutes

B. 20minutes

C. 25 minutes

D. 30 minutes

Answer: A

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46. The temperature coefficient of resistance of a wire is $0.00125/^{\circ}C$. Its resistance is 1 ohm at 300 K. its resistance will be 2 ohm at

A. 1127 K

B. 1400K

C. 1154K

D. 1100K

Answer: A

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47. A potentiometer has uniform potential gradient. The specific resistance of the material of the potentiometer wire is 10^{-7}

ohm-meter and the current passing through it is 0.1 ampere cross-section of the wire is $10^{-6}m^2$. The potential gradient along the potentiometer wire is

A. $10^{-6}V/m$

B. $10^{-4}V/m$

C. $10^{-8}V/m$

D. $10^{-2}V/m$

Answer: D

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48. A fuse wire with radius 1 mm blows at 1.5 ampere. The radius of the fuse wire of the same material to alow at 3A will be

A. $3^{1/4}$ mm

B. $4^{1/3}$ mm

C. $3^{1/2}$ mm

D. $2^{1/3}$ mm

Answer: D

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49. A wire in the form of a circular loop of one turn carrying a current produces a magnetic field B at the centre. If the same wire is looped into a coil of two turns and carries the same current, the new value of magnetic induction at the centre is

A. 3B

B. 5B

C. 4B

D. 2B

Answer: C

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50. To send 10% of the main current through a moving coil galvanometer of resistance 99 ohm the shunt required is

A. 10 ohm

B. 9.9 ohm

C. 9 ohm

D. 11ohm

Answer: D

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51. A hypothetical radioactive nucleus decays according to the following series:

$$A \xrightarrow{\alpha} A_1 \xrightarrow{\beta-} A_2 \xrightarrow{\alpha} A_3 \xrightarrow{\gamma} A_4$$

If the mass number and atomic number of A are respectively 180 and 72 then the atomic number and mass number of A_4 will be respectively

A. 69,171

B. 70,172

C. 68,172

D. 69,172

Answer: D

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52. Nucleus A is converted into C through the following reactions

$A \rightarrow B + \alpha$ α=particles

$B \rightarrow C + 2\beta^-$ $\beta =$ electron Then

A. A and B are isotopes

B. A and C are isobars

C. A and B are isobars

D. A and C are isotopes.

Answer: D

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53. If m, m_n and m_p are the masses of ${}_ZX^A$ nucleus, neutrol and proton respectively

A. $m = (A - Z)m_n + Zm_p$

B. $m < (A - Z)m_n + Zm_p$

C. $m > (A - Z)m_n + Zm_p$

D. $m = (A - Z)m_p + Zm_n$

Answer: B

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54. The electrical circuit used to get smooth DC output from a rectifier circuit is called

A. filter

B. oscillator

C. logic gates

D. amplifier

Answer: A

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55. In the case of constant α and β of a transistor

A. $\alpha = \beta$

B. $\beta < 1, \alpha > 1$

C. $\alpha\beta = 1$

D. $\beta > 1, \alpha < 1.$

Answer: D

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56. The magnitude flux linked with a coil at any instant 't' is given by $\phi = 5t^3 - 100t + 300$, the e.m.f. induced in the coil at t=2 second is

A. 40V

B. $-40V$

C. $300V$

D. $140V$

Answer: C

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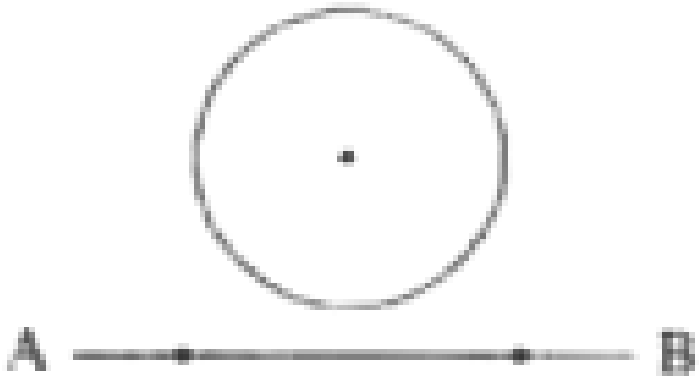

57.

A charged particle moves along the line AB which lies in the same plane of a circular loop of the conducting wire as shown in the figure above. Then,

A. no current will be induced in the loop

B. the current induced in the loop will change its direction as the charged

particle pases by

C. the current induced will be anticlockwise

D. the current induced will be clockwise

Answer: D

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58. The time taken by AC of 50 Hz in reaching from zero to the maximum value is

A. 50×10^{-3} sec

B. 5×10^{-3} sec

C. 1×10^{-2} sec

D. 2×10^{-2} sec

Answer: C

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59. The ratio of the secodnary to the primary turns in a transformer is 3:2 and the output power is P. neglecting all power losses, the input power must be

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

B. P

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

D. $\frac{3P}{2}$

Answer: B

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60. The material used for permanent magnet has

A. low retentivity, high coercivity

B. high retentivity, low coercivity

C. high retentivity, high coercivity

D. low retentivity, low coercivity

Answer: C

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