B-10

ENTRANCE EXAMINATION, FEBRUARY 2013

QUESTION PAPER BOOKLET

M. Sc. (PHYSICS)

Marks: 75

Time: 2.00 hrs. Hall Ticket No.: [ ]

I. Please enter you **Hall Ticket Number on Page 1 of this question paper and on the OMR sheet** without fail.

II. Read carefully the following instructions:

1. This Question paper has two Sections: **Section A** and **Section B**
2. **Section A** consists of 25 objective type questions of one mark each. **There is negative marking of 0.33 mark for every wrong answer.** The marks obtained by the candidate in this Section will be used for resolving the tie cases.
3. **Section B** consists of 50 objective type questions of one mark each. **There is no negative marking in this Section.**
4. Answers are to be marked on the OMR answer sheet following the instructions provided there upon. An example is shown below

   100. (A) ● (C) (D)

5. Only Scientific Calculators are permitted. Mobile phone based calculators are not permitted. Logarithmic tables are not allowed.
6. Hand over the OMR answer sheet at the end of the examination to the Invigilator.

This book contains 24 pages

III. Values of physical constants:
$c = 3 \times 10^8$ m/s; $h = 6.63 \times 10^{-34}$ J.s; $k_B = 1.38 \times 10^{-23}$ J/K
$e = 1.6 \times 10^{-19}$ C; $\mu_o = 4\pi \times 10^{-7}$ Henry/m; $\epsilon_o = 8.85 \times 10^{-12}$ Farad/m

SECTION - A

1. The function $y = f(x)$ satisfying the condition $f\left(x + \frac{1}{x}\right) = x^2 + \frac{1}{x^2}$, $x \neq 0$, is given by

   A. $y = x^2 + 2$

   B. $y = x^2 - 2$

   C. $y = x^2 - 1$

   D. $y = x^2 + 1$

2. The number of vectors orthogonal to $\vec{i} + 2\vec{j} - \vec{k}$ is

   A. One

   B. Two

   C. Three

   D. Infinite

3. $\vec{A} \cdot \left(\vec{B} \times \vec{C}\right) = 0$ implies that

   A. All the three vectors are parallel.

   B. All the three vectors are mutually perpendicular.

   C. Two of the three vectors are perpendicular

   D. The vectors lie in a plane.

4. $\lim_{x \to \infty} \left(\sqrt{x + 25} - \sqrt{x + 9}\right)$ is

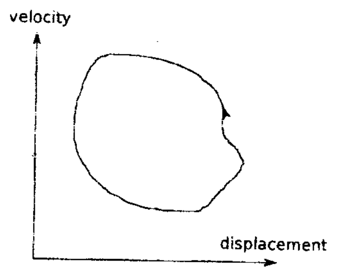
   A. ∞

   B. 16

   C. 2

   D. 0

5. For certain motion the plot of velocity versus displacement is shown in figure. The corresponding motion is



A. aperiodic
B. simple harmonic
C. periodic
D. with constant acceleration

6. A number is chosen at random from the set of integers $\{1, 2, \cdots, 1000\}$. What is the probability that it is divisible by 3 or 5? [i.e., either 3 or 5 or both]

A. 0.333
B. 0.2
C. 0.1
D. 0.467

7. A particle is moving along the x-axis such that its position at time t is given by $x(t) = 8.4 + 10t + t^3$. The most appropriate statement about the motion of this particle is

A. uniform motion
B. uniformly accelerating motion
C. acceleration increasing linearly with time
D. acceleration increasing quadratically with time

8. For small vibrations of a compound pendulum of mass m, moment of inertia I and distance a of the center of mass from the origin O, will have time period

A. $2\pi\sqrt{mga/I}$
B. $\frac{1}{2\pi}\sqrt{I/mga}$
C. $2\pi\sqrt{\frac{Iag}{m}}$
D. $2\pi\sqrt{\frac{Ig}{am}}$

9. A bullet of mass m moving with a velocity $10m/s$ hits a body of mass $3m$ which is at rest and gets stuck to it. The fraction of the original kinetic energy getting converted into heat is

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

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

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

   D. $\frac{5}{3}$

10. A particle of mass $5kg$ is moved from a point (0,1,2) to another point (1,0,1) by a constant force given by $\vec{F} = 6\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$ where $\hat{\imath}, \hat{\jmath}, \hat{k}$ are the orthogonal unit vectors and force and distance are measured in Newton and meter, respectively. The work done by this force is

    A. 5 J

    B. 0 J

    C. 4 J

    D. 9 J

11. For a flow of a compressible fluid through a narrow tube, the following statement is correct

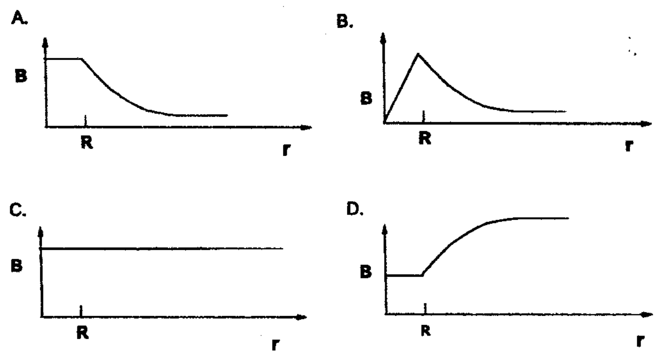
    A. the volume of the fluid crossing any section of the tube is constant.

    B. density of the fluid is independent of pressure.

    C. mass of the fluid crossing any section of the tube varies with time.

    D. mass of the fluid crossing any section of the tube per unit time is constant.

12. A straight cylindrical conductor with radius R carries a current I. The radial dependence of the magnetic field inside and outside the cylinder is given by



13. Let the electric field in a certain region of space be given by $\vec{E}(\vec{r}) = C\vec{r}/\epsilon_0 a^3$, where a has dimension of length and C is a constant. The charge density $\rho(\vec{r})$ is given by

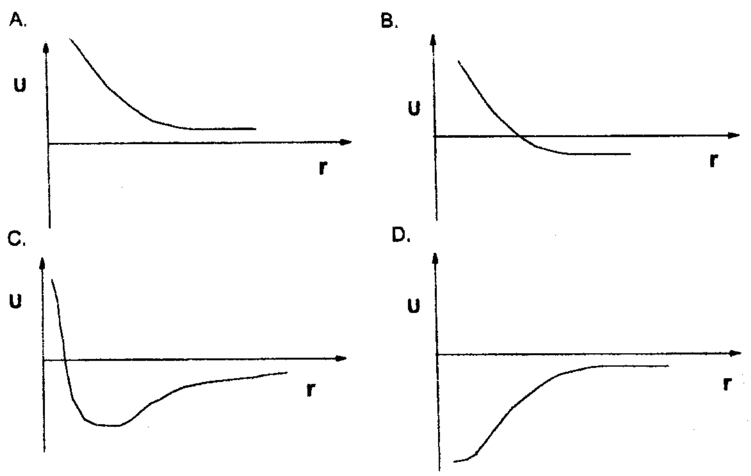
A. $\rho = 0$

B. $\rho = 3C/a^3$

C. $\rho = C\epsilon_0/a$

D. $\rho = C/\epsilon_0$

14. Four different cases of the interaction energy U between two objects as functions of their separation r are shown schematically in figure. The only attractive interaction is shown in



15. Three charges $-q, +\sqrt{2}q, +\sqrt{2}q$ are placed at the three corners of an equilateral triangle of side a. The work done in gathering the system of charges is given by

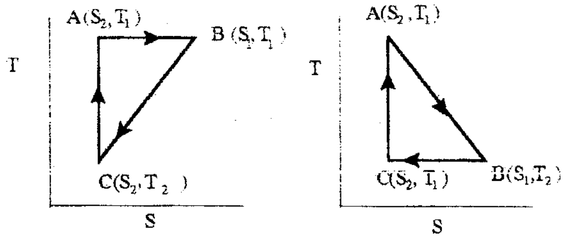
A. $(1-\sqrt{2})q^2/(4\pi a\epsilon_0)$

B. $(\sqrt{2}-1)q^2/(4\pi a\epsilon_0)$

C. $2(\sqrt{2}-1)q^2/(4\pi a\epsilon_0)$

D. $2(1-\sqrt{2})q^2/(4\pi a\epsilon_0)$

16. Depicted below are two reversible engines, marked 1 and 2, in T-S phase plane. Let η_1 and η_2 denote the efficiencies of the engines 1 and 2, respectively. Which of the following statement is correct



A. $\eta_1 < \eta_2$

B. $\eta_1 > \eta_2$

C. $\eta_1 = \eta_2 = 1 - \frac{T_2}{T_1}$

D. $\eta_1 = \eta_2 = 1 - \frac{S_2}{S_1}$

17. The internal energy of a system is expressed by function $U(S, V) = S^{4/3}V^{\alpha}$, where α is a constant. The value of α is

A. 1

B. 1/3

C. −1/3

D. 3/4

18. Let ΔW be the work done in an infinitesimal reversible process.Which of the following statemet is correct?

A. ΔW is a perfect differential only in an adiabatic process.

B. ΔW is not a perfect differential for all processes.

C. ΔW is a perfect differential for all processes

D. ΔW is a perfect differential only for an isothermal process.

19. The radius of the Bohr orbit for the ground state of the hydrogen atom is given by

A. $(4\pi\epsilon_0)\frac{\hbar^2}{me^2}$

B. $(4\pi\epsilon_0)\frac{me^2}{\hbar^2}$

C. $\frac{me^4}{4\epsilon_0\hbar^2}$

D. $\frac{\hbar^2}{4me^2}$

20. The energy eigenstate of a system must necessarily be a

A. A stationary state
B. A state having explicit time dependence.
C. A state having implicit time dependence.
D. A state with no time dependence.

21. The threshold wavelength of potassium is 558 nm. If a light of wavelength 400 nm is incident on it the stopping potential will be given by

A. 8.88 V
B. 0.88 V
C. 88.8 V
D. 2.22 V

22. For an electron having energy 1.5 MeV/c (mass of an electron is $0.5 MeV$), the velocity is given by

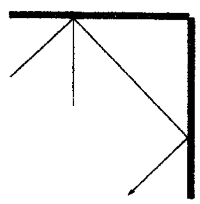
A. 2.92×10^{10} cm/sec
B. 2.81×10^{10} cm/sec
C. 2.75×10^{10} cm/sec
D. 2.50×10^{10} cm/sec

23. The impedance at the resonance frequency of a series RLC circuit with $L = 20$ mH, $C = 0.02$ μF and $R = 90\,\Omega$ is

A. $0\,\Omega$
B. $90\,\Omega$
C. $20\,k\Omega$
D. $40\,k\Omega$

24. A ray of light is incident at an angle θ on one of the two perpendicular mirrors as shown in the figure. The incident and emergent rays will be parallel if

A. $0 < \theta < \pi/2$
B. only for $\theta = 30^0$
C. only for $\theta = 45^0$
D. only for $\theta = 60^0$



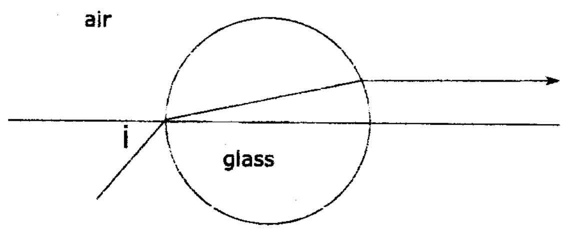
25. A light beam is incident on a sphere with refractive index $n = \sqrt{3}$ at an angle i from air and emerges parallel to the horizontal axis passing through the center of the sphere (see figure). Then

A. $30^0 < i < 60^0$

B. $i = 60^0$

C. $i = 45^0$

D. $i = 30^0$



SECTION - B

26. For a unit sphere, with center at the origin, the equation of the tangent plane at the point $(\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}})$ is

A. $x + y + z = \frac{1}{\sqrt{3}}$

B. $x - y + z = \frac{1}{\sqrt{3}}$

C. $x - y - z = \frac{1}{\sqrt{3}}$

D. $x + y - z = \frac{1}{\sqrt{3}}$

27. The divergence of $\vec{c} \times (\vec{r} \times \vec{c})$, where $\vec{c}$ is a numerical vector, is given by

A. zero

B. $|\vec{c}|^2$

C. $2|\vec{c}|^2$

D. $-2|\vec{c}|^2$

28. Let $(1-2i), (-3+4i), (2+2i)$ represent the three vertices A, B, C of a triangle ABC. The length of the meridian from C to the side AB is

A. $\sqrt{10}$

B. $\sqrt{12}$

C. 6

D. 8

29. Which of the following numbers does not lie on the unit circle $|z| = 1$?

A. $\left(\frac{1+i}{\sqrt{2}}\right)^{201}$

B. $\left(\frac{1+i}{1-i}\right)^{57}$

C. $\left(\frac{3+4i}{2-\sqrt{21}i}\right)$

D. $\sqrt{\frac{1+2i}{3-2i}}$

30. The system of linear equations

$$\begin{pmatrix} 4 & 9 & 3 \\ 2 & 3 & 1 \\ 2 & 6 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 6 \\ 2 \\ 7 \end{pmatrix}$$

A. has infinite number of solutions

B. has only trivial solution

C. has a unique solution

D. is inconsistent and has no solution

31. The matrix

$$\begin{pmatrix} 1 & 2 & -3 \\ +2 & 5 & -4 \\ -3 & -4 & 6 \end{pmatrix}$$

is

A. Hermitian

B. antisymmetric

C. orthogonal

D. idempotent

32. The coefficient of x^4 in the expansion of $\sqrt{1+2x^2}$ is

A. $-1/2$

B. $-15/32$

C. $-65/28$

D. $-21/128$

33. The value of the line integral $\int (y^2 + xy)dx + (x^2 - xy)dy$ taken along the straight line joining $(0,0)$ to $(2,1)$ is

A. 64/3
B. 32/3
C. 16/3
D. 8/3

34. The derivative of the composite function $y = \left(1 + \frac{1}{x}\right)^x$ is given by

A. $\left(1+\frac{1}{x}\right)^x \left[\ln\left(1+\frac{1}{x}\right) - \frac{1}{1+x}\right]$
B. $x\left(1+\frac{1}{x}\right)^{x-1}$
C. $x\left(1+\frac{1}{x}\right)^{x-1}\left(\frac{-1}{x^2}\right)$
D. $\ln\left(1+\frac{1}{x}\right) - \frac{1}{1+x}$

35. Given the functions $f(x) = x^2$, $g(x) = \sqrt{x}$, the compositions $f \circ g$ and $g \circ f$ are given by

A. $f \circ g(x) = x^2$, $g \circ f(x) = x^{3/2}$
B. $f \circ g(x) = x^{3/2}$, $g \circ f(x) = x^{3/2}$
C. $f \circ g(x) = x$, $g \circ f(x) = |x|$
D. $f \circ g(x) = x$, $g \circ f(x) = x$

36. Consider the differential equation $y' = y\cot(x) + \sin(x)$. The corresponding homogeneous linear equation has a general solution with C as the integration constant

A. $y = \cos(Cx)$
B. $y = \sin(Cx)$
C. $y = C\cos(x)$
D. $y = C\sin(x)$

37. The area of the surface obtained by rotating about the x-axis the arc of the curve $y = x^3/3$ from $x = -1$ to $x = 1$ is

A. $2\pi(\sqrt{2} - 1)/9$

B. $\pi(\sqrt{2} - 1)/9$

C. $2\pi(2\sqrt{2} - 1)/9$

D. $\pi(2\sqrt{2} - 1)/9$

38. A particle, of mass m and charge q, traveling with a velocity v along the x-axis enters a uniform electric field $\vec{E}$ directed along the y-axis. With entry point taken as the origin, the trajectory of the particle is given by

A. $y = qEx^2/(mv^2)$

B. $y = qEx^2/(mv)$

C. $y = qEx^2/(2mv^2)$

D. $y = qEx/(2mv)$

39. A uniform magnetic field $\vec{B}$ is perpendicular to the plane of a circular wire loop of radius R. The magnitude of the field varies with time according to $B = B_0 \exp(-t/\tau)$, where B_0 and τ are constants. The time dependence of the induced e.m.f. in the loop is

A. $\exp(-t^2/\tau^2)$

B. $1 + \exp(-t^2/\tau^2)$

C. $1 - \exp(-t/\tau)$

D. $-\exp(-t/\tau)$

40. A stone is thrown with an initial velocity 5m/s such that it covers maximum possible horizontal distance R_E on the surface of earth. The same stone is thrown with same initial velocity by a person standing on the moon, making an angle of 15° with the surface. Given that acceleration due to gravity on earth's surface is $g = 9.8m/s^2$ and that on moon's surface is g_m =1.6m/s^2, the horizontal distance it covers on the moon is

A. 0.326 R_E

B. 0.326/R_E

C. 3.06 R_E

D. -0.629 R_E

41. A body of mass 1 kg is constrained to move along a circle of radius 10 m. At a given instant, its speed is 5 m/s and the speed is increasing at the rate of 2.5 m/s^2. The angle between particle's velocity and acceleration is

A. 0°

B. 30°

C. 90°

D. 45°

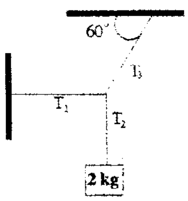
42. A body of mass 2 kg is suspended from two strings attached to the ceiling and the wall as shown in the figure. Tensions T_1, T_2, T_3 in the three strings are given, respectively, by

A. $T_1 = 11.3N, T_2 = 19.6N, T_3 = 22.6N$

B. $T_1 = 9.6N, T_2 = 22.6N, T_3 = 11.3N$

C. $T_1 = 11.6N, T_2 = 40.9N, T_3 = 19.3N$

D. $T_1 = 11.3N, T_2 = 7.7N, T_3 = 19.6N$



43. A solid cylinder of radius a and mass m rolls down an inclined plane without slipping. The inclined plane makes an angle α with the ground. The acceleration along the horizontal direction is given by

A. $(2g/3)\alpha \sin\alpha$

B. $mg\alpha \sin\alpha$

C. $(3/2)ma^2 \sin\alpha$

D. $(2/3)g \sin\alpha$

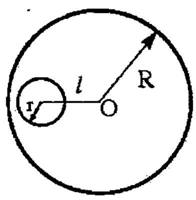
44. A circular uniform plate has mass m and radius R. A hole of radius r has been drilled in it. The distance between the center of the hole and the center of the circular plate is l. The moment of inertia of the plate with the hole, about an axis passing through the center of the plate and perpendicular to it is

A. $(1/2)m\left[R^2 - (r^2/R^2)(r^2 + 2l^2)\right]$

B. $(1/2)m\left[R^2 - (r^2/R^2)(r^2 + l^2)\right]$

C. $(1/2)m\left[R^2 - (R^2/r^2)(r^2 + 2l^2)\right]$

D. $(1/2)m\left[R^2 + (r^2/R^2)(r^2 + 2l^2)\right]$



45. A vertical rod is rotating with a constant angular velocity ω about its own axis. A light inextensible string of length l has one end attached to the top of the rod, while at the other end is a mass m. The string makes an angle θ with the rod. The tension in the string is given by

A. $m\omega^2 l$

B. $m\omega^2 l \cos\theta$

C. $m\omega^2 l \sin\theta$

D. $m(g+\omega^2)l$

46. A water tank has a hole of area A at its bottom. Water is poured into it, at the speed of v m/s by a tube of cross sectional area A. Then

A. the water level in the tank will keep on rising

B. no water can be stored in the tank

C. the water level will rise to a height $v^2/(2g)$ and then stop

D. the water level will oscillate

47. A water drop of radius 10^{-2}m is broken into 1000 equal droplets. If the surface tension of water is 0.075 Nm^{-1}, the gain in surface energy is

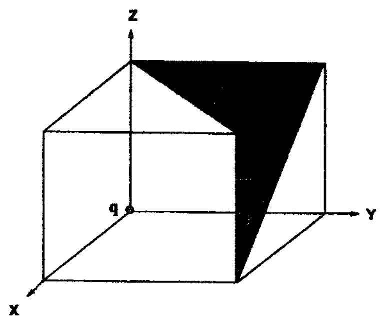
A. 7.5×10^{-4} J

B. 1×10^{-4} J

C. 9.5×10^{-4} J

D. 8.5×10^{-4} J

48. A charge q sits at one corner of a cube as shown in figure. The flux of electrostatic field $\vec{E}$ through the total shaded area is



A. $q/(48\epsilon_0)$

B. $q/(24\epsilon_0)$

C. $q/(4\epsilon_0)$

D. $q/(8\epsilon_0)$

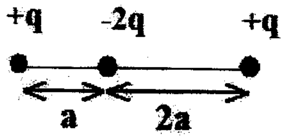
49. Three charges are kept on a straight line as shown in figure. With A and B denoting constants, the potential at a far off point ($r \gg a$) on the axis is given by

A. A/r

B. A/r^2

C. A/r^3

D. $A/r^2 + B/r^3 + ...$



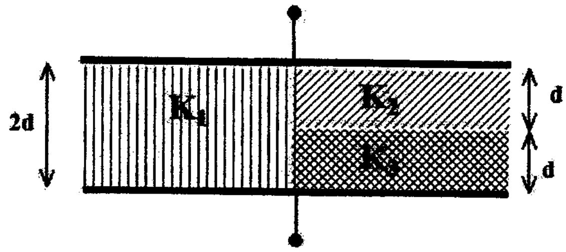
50. Three distinct materials with dielectric constants given by K_1, K_2, and K_3, respectively are arranged between two parallel plates of a capacitor of area A, as shown in the figure. The effective capacitance of the system is

A. $C = \dfrac{2\epsilon_0 A}{d} \dfrac{K_1 K_2 K_3}{K_1 + K_2 + K_3}$

B. $C = \dfrac{2\epsilon_0 A}{d} \left(\dfrac{K_1 + K_2 + K_3}{3}\right)$

C. $C = \dfrac{\epsilon_0 A}{2d} \left(\dfrac{K_1}{2} + \dfrac{K_2 K_3}{K_2 + K_3}\right)$

D. $C = \dfrac{\epsilon_0 A}{2d} \left(\dfrac{K_3}{2} + \dfrac{K_2 K_1}{K_1 + K_2}\right)$



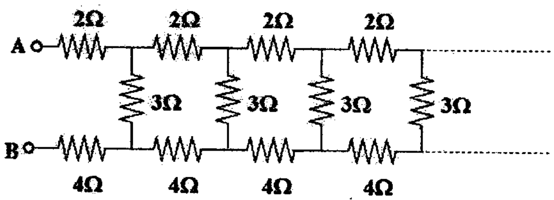
51. An infinite ladder network is shown in figure. The effective resistance between points A and B is

A. $3(1+\sqrt{3})\Omega$

B. $3(1+\sqrt{7})\Omega$

C. $3(1+\sqrt{2})\Omega$

D. $3(1+\sqrt{5})\Omega$



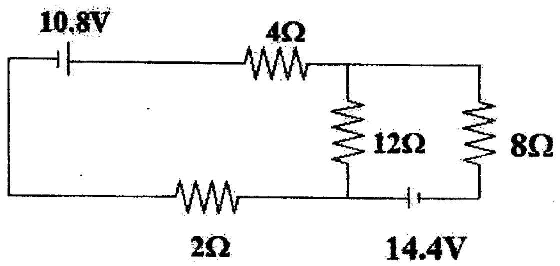
52. The total current I flowing through the 12 Ω resistance is

A. $I = 1.8$ A

B. $I = 1.2$ A

C. $I = 1$ A

D. $I = 0$ A



53. In a one dimensional potential well with impenetrable walls occupying the domain $0 \leq x \leq d$, a particle in the lowest energy state has the maximum probability to be found at

A. $x = 0$

B. $x = d/2$

C. $x = d/4$

D. $x = d$

54. According to Bohr's model, the second line of the Balmer series is obtained when there is a transition from $n = 4$ to $n = 2$. The wavelength of the line is given by

A. 486 nm

B. 587 nm

C. 410 nm

D. 520 nm

55. A scientist performing the Compton scattering experiment finds that the incident wavelength λ_1 is shifted by 1.5 percent for the scattering angle of 120°. The wavelength λ_1 is given by

A. 0.242 nm

B. 2.420 nm

C. 24.200 nm

D. 0.024 nm

56. In the conversion of one gram mass into energy, the amount of energy released per hour is

A. 2.0×10^9 kW

B. 2.5×10^7 kW

C. 3.0×10^{10} kW

D. 3.5×10^{11} kW

57. Two electrons are ejected in opposite directions from a sample of radioactive atoms. Each electron has a speed of 0.67c as measured by a laboratory observer. Their relative velocity is given by

A. 1.34 c

B. 1.19 c

C. 0.92 c

D. 0.87 c

58. An unstable particle of rest energy 1000 MeV decays into a μ-meson and a neutrino with a mean life 10^{-8}sec, when at rest. If the particle has a momentum of 1000 MeV/c the mean decay distance is given by

A. 140 cm

B. 200 cm

C. 300 cm

D. 420 cm

59. Let $m_{\text{He}}, m_p, m_n, m_e$ represent the masses of ^{4}He nucleus, proton, neutron and electron, respectively. These masses satisfy the following relation

A. $m_{\text{He}} = 2(m_p + m_n + m_e)$

B. $m_{\text{He}} = 2(m_p + m_n)$

C. $m_{\text{He}} > 2(m_p + m_n)$

D. $m_{\text{He}} < 2(m_p + m_n)$

60. An experiment shows that a given radioactive element emits 100 α particles/minute initially and after 10 seconds the rate becomes 10 α particles/minute. The half life period of this α-emitter (upto 2nd decimal place) is

A. 3.00 sec.

B. 0.33 sec.

C. 30.00 sec.

D. 0.03 sec.

61. An electron is moving with a speed $c/2$ where c is the velocity of light. The electron mass will

A. remain constant

B. become double

C. become 33% more of its rest mass

D. becomes 15% more of its rest mass

62. A piece of metal at 400 K with heat capacity of 1000 JK^{-1} is pushed into a heat bath at 100K and cooled. The change in entropy of the universe is

A. -1386 JK^{-1}

B. 3000 JK^{-1}

C. 1614 JK^{-1}

D. zero JK^{-1}

63. Partial derivative of $P \equiv P(S, V)$ with respect to S at constant V, i.e., $\left(\frac{\partial P}{\partial S}\right)_V$ equals

A. $-\left(\frac{\partial V}{\partial T}\right)_P$

B. $\left(\frac{\partial T}{\partial V}\right)_S$

C. $-\left(\frac{\partial P}{\partial T}\right)_V$

D. $-\left(\frac{\partial T}{\partial V}\right)_S$

64. An ideal gas at pressure P is heated to twice its temperature keeping its volume constant. It is then cooled to its original temperature at constant pressure. The work done is

A. $2PV$

B. $P^2\sqrt{V}$

C. PV

D. $PV/2$

65. The turns ratio of a transformer required to match an 80 Ω source to a 320 Ω load is

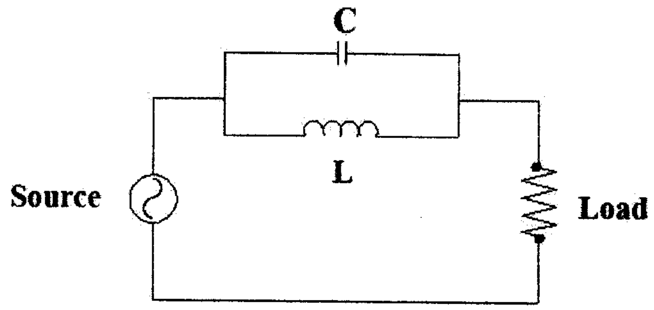
A. 80

B. 20

C. 4

D. 2

66. The filtering action offered by the resonant circuit shown in the figure is



A. High Pass
B. Low Pass
C. Band Pass
D. Band Stop

67. A coil which has an inductance of 40 mH and a resistance of 2Ω is connected together to form a RL series circuit. If they are connected to a 20V DC supply, the time constant of the RL series circuit is

A. 20 ms
B. 200 ms
C. 100 ms
D. 1000 ms

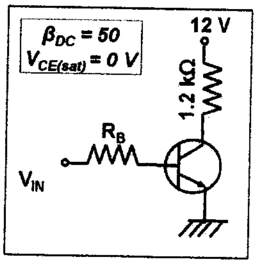
68. A germanium diode is operated at 20°C. A reverse bias of -1.5 V results in a current of 70 μA. Assuming that the temperature remains constant, the reverse saturation current is approximately

A. 60 μA
B. 60 nA
C. 35 μA
D. -60 μA

69. A 10 V battery, 250Ω resistor and a Zener diode are connected in series such that the Zener diode is reverse biased. If the Zener breakdown voltage is 5V, the current flowing through this diode is

A. 40 mA
B. 20 mA
C. 25 mA
D. 10 mA

70. The minimum value of the base current I_B required to saturate the transistor shown in figure is given by



A. 0.2 mA
B. 10 mA
C. 1.2 mA
D. 0.12 mA

71. The superposition of two oscillations given by $y = A[\sin(\omega_1 t) + \sin(\omega_2 t)]$ is periodic if only the frequencies satisfy the relation

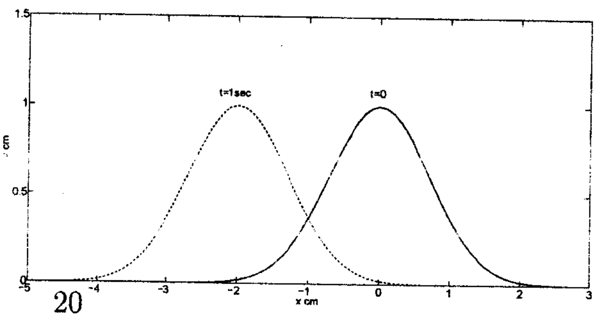
A. ω_1/ω_2 is a real number
B. ω_1/ω_2 is an integer
C. ω_1/ω_2 is rational
D. ω_1/ω_2 is irrational

72. A body executes simple harmonic motion about the origin with amplitude $A = 13\ cm$ and period $T = 12\ sec$. At time $t = 0$ it is at $x = 13\ cm$. The shortest time of passage from $x = 6.5\ cm$ to $x = -6.5\ cm$ is

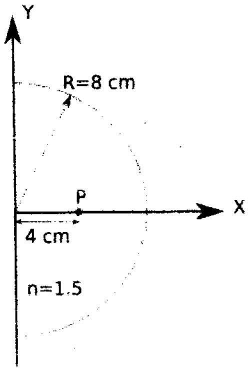
A. 4 sec
B. 3 sec
C. 2 sec
D. 1 sec

73. The profile of a wave at time $t = 0$ and at $t = 1\ sec$ with $A = 1\ cm$, $B = 1\ cm^{-2}$ and $v = 2\ cm\ sec^{-1}$ is shown in figure. The wave can be represented by the expression

A. $y = Ae^{-B(x-vt)^2}$
B. $y = Ae^{-B(x+vt)^2}$
C. $y = Ae^{-B(x-vt)(x+vt)}$
D. $y = Ae^{B(x-vt)(x+vt)}$



74. A glass (with refractive index 1.5) hemisphere in air with radius of curvature 8 *cm* has a spot P at $x = 4$ *cm*. Viewed along x from the right, the spot will be imaged by the spherical surface at $x =$



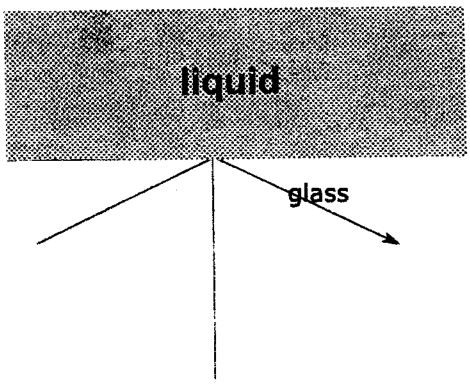
A. 6.2*cm*

B. 5.8 *cm*

C. 4.8 *cm*

D. 3.2 *cm*

75. A ray of light is incident at an angle 60^0 on an interface between glass with refractive index 1.5 and a liquid with refractive index n. The ray will be totally internally reflected only if



A. $n < \sqrt{3}/2$

B. $n < \sqrt{3}$

C. $n > \sqrt{3}$

D. $n < 3\sqrt{3}/4$