

PU M Sc Physics

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149 PU_2015_374

Let $i = \sqrt{-1}$. Then, one root of $(3 + 4i)^{1/3}$ is:-

- 1.265 - 1.151 i
- 0.3641 - 1.671 i
- 0.3641 - 1.671 i
- 1.629 - 0.5202 i

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131 PU_2015_374_New

In Michelson interferometer, as you decrease the separation between the two mirrors:-

- No change in fringe pattern
- Fringes appear collapsing
- Fringes appears expanding
- Sometimes it collapses and sometimes it expands

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113 PU_2015_374_New

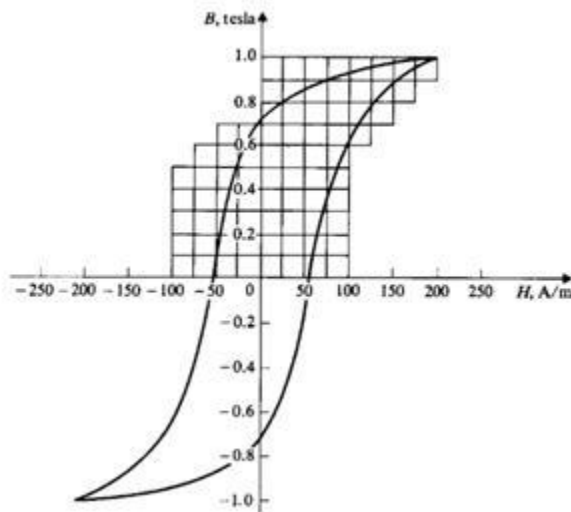
The ground state energy of a positronium is most nearly equal to:-

- 6.8 eV
- 13.6 eV
- 2 7.2 eV
- 3.4 eV

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127 PU_2015_374

Consider the B-H loop for a magnetic material. Determine approximately the hysteresis loss per cycle in a torus of 300 mm mean diameter and a square cross section of 50x50 mm.



- 2.5 J
- 215 J
- 50.2 eV
- 0.507 J

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111 PU_2015_374_New

Young modulus Y, rigidity modulus n and poisson ratio are related as:-

- $2Y = n(1 + \sigma)$
- $\frac{Y}{n} = 2(1 + \sigma)$
- $\sigma = \frac{2Y}{1 + n}$
- $Y = \frac{2n}{1 + \sigma}$

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105 PU_2015_374_New

A solenoid having a core of 10^{-3}m^2 in cross section is 1m length. Half of it is introduced with iron. If the number of turns is 2000, its self inductance is _____.

Given μ_r for axis is 1. μ_r for Fe=500, $\mu_o = 4 \pi \times 10^{-7} \text{H/m}$

- 1.1 H
- 1.26 H

- 3.50 H
- 4.25 H

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109 PU_2015_374

-
-
-
- $f(\vec{\nabla} \cdot \vec{A}) - \vec{A} \cdot (\vec{\nabla} f)$

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132 PU_2015_374_New

An antiproton is an atomic particle that has:-

- the mass of a proton and the charge of an electron.
- the mass of a neutron and the charge of a proton.
- the mass of an electron and the charge of a proton.
- the mass of a proton and the charge of a neutron

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121 PU_2015_374_New

The phase change of π is observed on reflection from:-

- a) denser to rarer medium
- b) rarer to denser medium
- c) Both (a) & (b)
- d) None of these

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123 PU_2015_374

A Germanium diode operated at a junction temperature of 27 °C. For a forward current of 10 mA, the voltage across diode is found to be 0.3 V. If the voltage across diode is 0.4 V then the forward current will be:-

- 4.773 A

- 477.3 mA
- 47.73 mA
- 4.773mA

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145 PU_2015_374

The value of the limit $\lim_{x \rightarrow 0} \sin(1/x)$ _____.

- Is equal to zero.
- Is equal to one.
- Exists but not unique.
- Does not exist.

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105 PU_2015_374

The angle made by a vector $\vec{P} = 3\hat{i} + 4\hat{j} + 5\hat{k}$, with respect to the x -axis is:-

- $\sin^{-1}(3/\sqrt{50})$
- $\sin^{-1}(3/\sqrt{12})$
- $\cos^{-1}(3/\sqrt{50})$
- $\cos^{-1}(3/\sqrt{12})$

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147 PU_2015_374

How much energy is required to raise the temperature of 200 g of aluminium from 60 C to 90 C? The specific heat of aluminium is 900 J/kg/K.

- 27000 J
- 5400 J
- 180 J
- 5.4 J

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100 PU_2015_374_New

The quantities **B**, **H** and **I** are related as:-

- $\mathbf{B} = \mu_0(\mathbf{H} + \mathbf{I})$
- $\mathbf{B} = \mu_0(\mathbf{H} + \mathbf{IK})$

$\mathbf{B} = \mu_0 \mathbf{I} + \mathbf{KH}$

$\mathbf{B} = \mu_0 \mathbf{H} + \mathbf{I}$

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106 PU_2015_374

Consider a vector in the first quadrant of the 2-D plane $\vec{A} = 2\hat{i} + \hat{j}$. If this vector is rotated by 45 degrees then the resultant vector will be:-

$-0.71\hat{i} + 2.12\hat{j}$

$-0.71\hat{i} - 2.12\hat{j}$

$0.71\hat{j} + 2.12\hat{i}$

$0.71\hat{i} + 2.12\hat{j}$

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129 PU_2015_374

The permeability of para and ferromagnetic materials are:-

less than unity

equal to unity

negative

greater than unity

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104 PU_2015_374_New

The co-efficient of self inductance of a coil of 500 turns when a current of 125mA produces a magnetic flux of 0.5 micro weber is:-

$200\mu\text{H}$

$20\mu\text{H}$

4mH

$2 \times 10^{-3}\text{H}$

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142 PU_2015_374

A solid sphere made of insulating material has a radius R and has a total charge Q distributed uniformly in its volume. The magnitude of electric field intensity, E , at a distance r ($0 < r < R$) inside the sphere is:-

$\frac{3Qr}{4\pi\epsilon_0} \left(\frac{1}{R^3} \right)$

- $\frac{Qr}{4\pi\epsilon_0} \left(\frac{1}{R^3} \right)$
- $\frac{QR}{4\pi\epsilon_0} \left(\frac{1}{r^3} \right)$
- $\frac{Q}{4\pi\epsilon_0} \left(\frac{1}{r^3} \right)$

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101 PU_2015_374

Consider the given two vectors $\vec{A} = \hat{i} - 2\hat{j}$ and $\vec{B} = 2\hat{j} - 4\hat{i}$. The cross product between these two vectors is:-

- $2\hat{i} - 8\hat{j}$
- $4\hat{j} - 4\hat{i}$
- $8\hat{i} + 4\hat{j} + 2\hat{k}$
- $-6\hat{k}$

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116 PU_2015_374_New

Small liquid drops assume spherical shape because:-

- volume of spherical drop is minimum
- atmospheric pressure exerts a force on a liquid drop
- liquid tends to have the minimum surface area due to surface tension
- gravitational force acts upon the drop

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102 PU_2015_374_New

According to the principle of superposition of waves when two waves superpose each other, algebraic addition takes place in:-

- Amplitude
- Wavelength
- Intensity
- Frequency

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141 PU_2015_374

A positive and a negative charge are initially 50 mm apart. When they are moved close together so that they are now only 10 mm apart, the force between them will be:-

- 5 times greater than before
- 5 times smaller than before
- 15 times greater than before
- 25 times larger than before

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117 PU_2015_374_New

The rate of flow of liquid through a hole of particular size in table is:-

- more at midway between top and bottom
- more if situated near its top
- more if situated near the bottom
- independent of its height from its bottom

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115 PU_2015_374_New

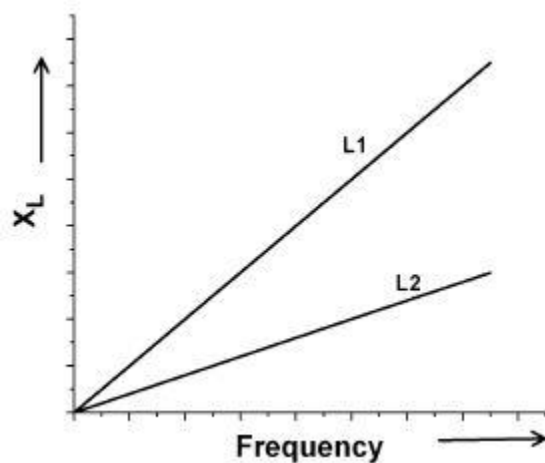
A drop of oil is placed on the surface of water, which of the following statements is correct?

- It will remain on it as a sphere
- It will flood as a distorted drop on water surface
- It will be partly as spherical droplets and partly as thin film
- It will spread as a thin layer

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143 PU_2015_374_New

From figure we can say:-



- $L1 = L2$
- we can't say
- $L2 > L1$

- $L1 > L2$

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126 PU_2015_374

In the case of series tuned circuit the Q-factor will increase as the resistance:-

- Quadruples
 Triples
 Doubles
 Decreases

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108 PU_2015_374

The curl of a gradient is always:-

- It may vary between zero and any positive real number depending upon the actual vectors involved
 Zero
 Less than zero
 Greater than zero

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140 PU_2015_374

The magnetic field of an infinitely long wire carrying a uniform current I at a distance r perpendicular to the wire will be:-

- Inversely proportional to r
 Inversely proportional to r^2
 Inversely proportional to $r^{3/2}$
 Inversely proportional to $1/r^2$

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125 PU_2015_374_New

Half wave plate introduces a phase difference of _____ between ordinary and extra-ordinary waves.

- 360°
 90°
 180°
 270°

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107 PU_2015_374_New

A straight solenoid has two turns in the primary and 200 turns in the secondary. The area of cross section is 4 cm^2 . The mutual inductance in the circuit is:-

- 1000 H
 50 H

- 100 H
- 20 H

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112 PU_2015_374_New

If a uniform rod of a material of $\sigma = 0.2$ suffers longitudinal strain 4×10^{-3} the percentage of change in its volume will be:-

- 0.24%
- 20%
- 52%
- 0.5%

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114 PU_2015_374_New

If two soap bubbles of different radii are in communication with each other:-

- the air flows from the larger
- air flows from the larger bubble till the sizes are equal
- air flows from the smaller bubble into the larger one and the larger bubble grows at the expense of the smaller one
- the size of the bubbles remains the same

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104 PU_2015_374

Consider two functions $f(x)$ and $g(x)$ as given below.

$$f(x) = x^2 + 5; \quad g(x) = (2\sqrt{x} - 1)^2$$

In the limit of $x \rightarrow \infty$ which one of the following is true?

- $f(x)$ grow faster than $g(x)$
- $f(x)$ grow slower than $g(x)$
- Both the functions grow at the same rate.
- We cannot compare their growth rates from the data given.

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128 PU_2015_374

For a linear homogeneous and isotropic magnetic material, in SI units, the quantities **B**, **H** and **M** are best related by

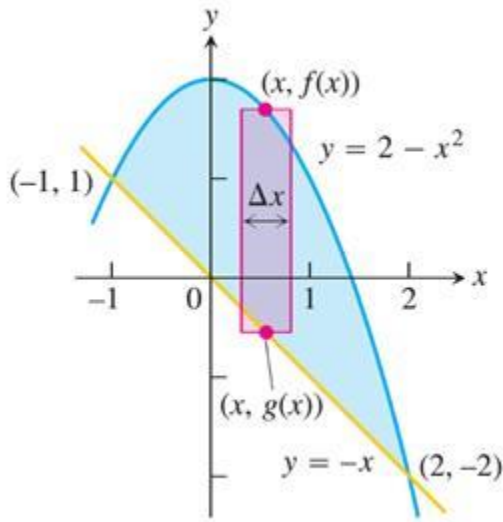
- $\mathbf{B} = \mu \mathbf{H} + \mathbf{M}$

- $\mathbf{B} = \mu(\mathbf{H} + \mathbf{M})$
- $\mathbf{B} = \mu \mathbf{H}$
- $\mathbf{H} = \mu(\mathbf{B} + \mathbf{M})$

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103 PU_2015_374

What is the area enclosed by the parabola and the straight line shown in the adjoining figure?



- 1.5
- 3
- 4.5
- 2

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143 PU_2015_374

For static magnetic field, Maxwell's curl equation is given by:-

- $\nabla \times \mathbf{B} = 0$
- $\nabla \cdot \mathbf{B} = \mu_0 \mathbf{J}$
- $\nabla \times \mathbf{B} = \mu_0 \mathbf{J}$
- $\nabla \times \mathbf{B} = \frac{\mu_0}{\mathbf{J}}$

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122 PU_2015_374

The solar cell connected to a 100 mA current source has reverse saturation current of 1 nA and open circuit voltage of:-

- 0.477 V

- 0.8 V
- 4.77 V
- 0.954 V

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144 PU_2015_374

Evaluate the real integral:

$$\int_2^3 \sqrt{x^2 - 4} dx$$

- +1.429
- 1.421
- $3\sqrt{5}/2$
- $\cosh^{-1}(3/2)$

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144 PU_2015_374_New

A straight horizontal length of copper wire has a current $i = 28$ A through it. The mass per unit length of copper is 46.6 g m^{-1} . What is magnitude of the magnetic field B needed to suspend the wire in air (that is to balance gravitational force on it)?

- 0.28 T
- 0.16 T
- 1.6×10^{-2} T
- 28 times the strength of earth's magnetic field.

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124 PU_2015_374

A Zener diode has specifications of $V_Z = 5.2$ V and $P_{D(\max)} = 260$ mW. The maximum allowable current when Zener diode is acting as regulator (assuming $R_Z = 0 \Omega$) is:-

- 5 mA
- 50 mA
- 5 A
- 50 A

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118 PU_2015_374_New

The profile of advancing liquid through a tube is:-

- hyperbola
- straight line
- semicircle
- parabola

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148 PU_2015_374

Let \mathbf{u}, \mathbf{v} be vector fields and f, g, ϕ be scalars. Then, which of the following is false?

- $\mathbf{u} \times (\vec{\nabla} \times \mathbf{u}) = \frac{1}{2} \vec{\nabla} u^2 - (\mathbf{u} \cdot \vec{\nabla}) \mathbf{u}$
- $\vec{\nabla} \cdot (\mathbf{u} \times \mathbf{v}) = \mathbf{v} \cdot (\vec{\nabla} \times \mathbf{u}) + \mathbf{u} \cdot (\vec{\nabla} \times \mathbf{v})$
- $\vec{\nabla} \cdot (\vec{\nabla} \times \mathbf{u}) = \vec{\nabla} \times \vec{\nabla} \phi$
- $\vec{\nabla} \cdot (f \vec{\nabla} g) = f \nabla^2 g + \vec{\nabla} f \cdot \vec{\nabla} g$

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122 PU_2015_374_New

Lasing in LASER is due to:-

- a) Spontaneous emission
- b) Stimulated emission
- c) Both (a) and (b)
- d) None of the above

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102 PU_2015_374

Let z be a complex variable and let $\theta = \sin^{-1} z$. Using $\sin^2 \theta + \cos^2 \theta = 1$, choose the right statement.

- $\sin^{-1} z = i \log \left(iz \pm \sqrt{1 - z^2} \right)$
- $\sin^{-1} z = -i \log \left(z \pm i \sqrt{1 - z^2} \right)$
- $\sin^{-1} z = -i \log \left(z \pm \sqrt{1 - z^2} \right)$

$\sin^{-1} z = -i \log \left(iz \pm \sqrt{1 - z^2} \right)$

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107 PU_2015_374

Let f be a scalar function and \vec{A} be a vector valued function.

Then $\vec{\nabla} \times (f \vec{A}) = \underline{\hspace{2cm}}$.

- $f(\vec{\nabla} \times \vec{A}) + \vec{A} \times (\vec{\nabla} f)$
- $f(\vec{\nabla} \times \vec{A}) - \vec{A} \times (\vec{\nabla} f)$
- $f(\vec{\nabla} \cdot \vec{A}) - \vec{A} \cdot (\vec{\nabla} f)$
- $f(\vec{\nabla} \cdot \vec{A}) - \vec{A} \times (\vec{\nabla} f)$

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127 PU_2015_374_New

We can measure _____ coherence using Michelson interferometer.

- a) Temporal
- b) Spatial
- c) Both (a) and (b)
- d) None of the above

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124 PU_2015_374_New

Breakdown in Zener diode happens due to avalanche multiplication then diode is:-

- Doesn't depend on doping
- Heavily doped
- Moderately doped
- Lightly doped

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120 PU_2015_374

The energy gap of GaAs is 1.43 eV emits electromagnetic radiation of:-

- 820 nm
- 869 nm
- 896 nm

- 840 nm

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126 PU_2015_374_New

In bipolar junction transistor the modulation of the effective base width by collector voltage is known as:-

- Milliman effect
 Early effect
 Johnson effect
 None of the above

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121 PU_2015_374

The transformer of a half-wave rectifier has a secondary voltage of 20 V (rms) and a winding resistance of $10\ \Omega$. The diode has a forward resistance of $5\ \Omega$. Then the dc output voltage when the load is drawing 20 mA is:-

- 7.8 V
 8.7 V
 7 V
 8 V

51 of 100

101 PU_2015_374_New

The permeability of para and ferromagnetic materials are:-

- negative
 less than unity
 equal to unity
 greater than unity

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110 PU_2015_374_New

The extension of a wire by the application of a load is 3mm. The extension in a wire of the same material and length but half the radius by the same load will be:-

- 1.5 mm
 12 mm
 0.75 mm
 6 m

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146 PU_2015_374

Consider a right angled triangle whose hypotenuse is h and base is x . For what value of x , the area of the triangle will be a maximum?

- $x = h^2/\sqrt{2}$
- $x = (\sqrt{3}/2)h$
- $x = h^2/4$
- $x = h/\sqrt{2}$

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100 PU_2015_374

Consider the given two vectors $\vec{A} = \hat{i} - 2\hat{j}$ and $\vec{B} = 2\hat{j} - 4\hat{k}$. The dot product between these two vectors is:-

- 10
- 25
- 4
- 10

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106 PU_2015_374_New

A particle starts SHM from its mean position. Its amplitude is 'a' and total energy is 'E'. At one instant its kinetic energy is $3E/4$. Its displacement at that instant is:-

- a/2
- $a/\sqrt{3/2}$
- $a/\sqrt{2}$
- $a/\sqrt{3}$

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119 PU_2015_374_New

Principle of Superposition can be best represented by:-

- $y = y_1/ y_2$
- $y = f(y_1, y_2; y \neq y_1 + y_2)$
- $y = y_1 y_2$
- $y = y_1 + y_2$

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130 PU_2015_374_New

The variation of the speed of sound with temperature is greatest in:-

- Gases
- Liquids
- Metals
- Solids

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109 PU_2015_374_New

A generator having 24 poles would give a frequency 50 Hz when rotated at a speed of:-

- 100 rpm
- 250 rpm
- 600 rpm
- 500 rpm

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125 PU_2015_374

A bipolar junction transistor has $\alpha = 0.99$, $I_B = 25 \mu\text{A}$ and $I_{CBO} = 200 \text{ nA}$. Then the dc collector current value will be:-

- 0.2495 mA
- 2.495 mA
- 2.495 A
- 24.95 mA

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123 PU_2015_374_New

Diffraction of light can be understood by:-

- a) Wave nature of light
- b) Particle nature of light
- c) Both (a) and (b)
- d) None of the above

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222 PU_2015_374

According to Kirchhoff's Law of radiation:-

- Bad absorber are good emitters
- Bad absorbers are bad emitters
- Good absorbers are good emitters
- Good absorbers are bad emitters

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247 PU_2015_374

Determine d^2y/dx^2 using the following expressions

$$x(t) = t(1-t) \text{ and } y(t) = t(1-t^2)$$

- $3t$
- $\frac{2-6t+6t^2}{(1-2t)^3}$
- $\frac{1-3t^2}{1-2t}$
- $\frac{2-6t+6t^2}{(1-2t)^2}$

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220 PU_2015_374

The total number of degrees of freedom for a diatomic molecule is:-

- 5
- 4
- 3
- 6

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248 PU_2015_374

Given $y^2 = x^2 + \sin(xy)$. Determine dy/dx .

- $\frac{dy}{dx} = \frac{2x + x \cos(xy)}{2y - x}$
- $\frac{dy}{dx} = \frac{2y - x \cos(xy)}{2x + y \cos(xy)}$
- $\frac{dy}{dx} = \frac{2x + y \cos(xy)}{2y - x \cos(xy)}$
- $\frac{dy}{dx} = \frac{2x + y \cos(xy)}{2y}$

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243 PU_2015_374

Gamma rays are one of the forms of radiation produced in a nuclear reaction. Which of the following statements is correct?

- both gamma rays and X-rays can ionise atoms but are emitted from different sources
- both gamma rays and X-rays can ionise atoms and are emitted from the same sources
- X-rays can ionise atoms but gamma rays cannot
- gamma rays can ionise atoms but X-rays cannot

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223 PU_2015_374

For a perfect black body the absorptive power is:-

- 0
- ∞
- 0.5
- 1

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254 PU_2015_374

A cylinder has to be designed such that it should have a constant volume C with minimum surface area A . What should be relation between its radius r and height h to achieve this goal? Assume SI units for all variables.

- $h = 2r$
- $h = r$
- $h = \sqrt{3}r$
- $r = 2h$

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221 PU_2015_374

Transfer of heat from a body A at low temperature to a body B at high temperature is:-

- possible by keeping both bodies in contact
- possible by doing some external work
- impossible
- only possible after temperature of B is lowered than A

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249 PU_2015_374

Calculate the slope of the curve $x^3 + y^3 - 9xy = 0$ at the point (2,4).

- 5/4
- 1/2

- 4/5
- 2/5

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244 PU_2015_374

For an α -particle why do the nuclei with higher atomic numbers have shorter half-life than nuclei with smaller atomic numbers?

- the coulomb repulsion increases much faster than the nuclear binding force.
- higher atomic number makes the magnetic moment higher
- as the atomic number increases the kinetic energy of the α -particle inside increases
- none of these

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251 PU_2015_374

A sufficiently smooth function $y = f(x)$, $-L < x < L$ is said to be concave-up if

- $f'(x)$ is an increasing function
- $f''(x) < 0$
- $f'(x) > 0$
- $f'(x)$ is a decreasing function

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242 PU_2015_374

The half-life of radioactive carbon is 5700 years. How long will it take for a sample of radioactive carbon to become one-fourth as active as it is now?

- 1425 years
- 5700 years
- 2850 years
- 11400 years

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231 PU_2015_374

Gauss-Jacobi method is used for:-

- Matrix inversion.
- Solving a system of linear equations.
- Finding eigen values of a matrix.
- Solving a single algebraic equation.

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233 PU_2015_374

Consider a plot of the function $y = f(x)$ and a constant $h > 0$. Then,

- $y = f(x + h)$ will shift the graph of $y = f(x)$ right side by h units.
- $y = f(x + h)$ will shift the graph of $y = f(x)$ left side by h units.
- $y = f(x) + h$ will shift the graph of $y = f(x)$ right side by h units.
- $y = f(x) + h$ will shift the graph of $y = f(x)$ left side by h units.

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241 PU_2015_374

An antiproton is an atomic particle that has:-

- the mass of an electron and the charge of a proton.
- the mass of a proton and the charge of a neutron.
- the mass of a neutron and the charge of a proton.
- the mass of a proton and the charge of an electron.

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232 PU_2015_374

How many roots are there for the function $g(x)$ where:-

$$g(x) = e^x - 3x - 2$$

- No roots.
- Infinitely many roots.
- Cannot determine because the given equation is nonlinear.
- Two roots.

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252 PU_2015_374

The point of inflection of a smooth function $f(x)$ is:-

- The point at which $f''(x) = 0$ and $f'(x) = 0$
- The point where the concavity of the function $f(x)$ changes.
- The point at which $f''(x) = 0$
- The point at which $f'(x) = 0$

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253 PU_2015_374

The point of inflection of the curve $y(x) = 3 + \sin x$, $0 < x < 2\pi$ is:-

- (0, 3)
- (0, 0)
- (π , 3)
- (π , 0)

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246 PU_2015_374

If $\tan \theta = 3/2$ and if $0 < \theta < \pi/2$ then, choose the wrong statement.

- We cannot conclude because θ is not a constant but rather varying between
- 0 and $\pi/2$.
 - $\operatorname{cosec} \theta = \sqrt{13}/3$
 - $\cos \theta = 2/\sqrt{13}$
 - $\cot \theta = 2/3$

80 of 100

224 PU_2015_374

The thermodynamic variables Mass, Volume and density are:-

- Mass and Volume are extensive but density is intensive variable
- Mass and Volume are intensive but density is extensive variable
- All intensive variable
- All extensive variable

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296 PU_2015_374

In an ellipse, the distance between the foci is 6 and the minor axis is 8. Then, its eccentricity is :-

- 4/5
- $1/\sqrt{5}$
- 3/5
- 1/2

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264 PU_2015_374

Half wave plate introduces a phase difference of ____ between ordinary and extra-ordinary waves.

- 180°
- 90°
- 360°
- 270°

83 of 100

277 PU_2015_374

If the vertex of a triangle is (1, 1) and the midpoints of two sides through this vertex are (-1, 2) and (3, 2) then, the centroid of the triangle is:-

- $\left(-\frac{1}{3}, \frac{7}{3}\right)$
- $\left(1, \frac{7}{3}\right)$
- $\left(\frac{1}{3}, \frac{7}{3}\right)$
- $\left(-1, \frac{7}{3}\right)$

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274 PU_2015_374

A man standing between two cliffs claps his hands and starts hearing a series of echoes at intervals of 1s. Taking the speed of sound in air as 330 m/s, the distance between the cliffs should be:-

- 330 m
- 165 m
- 660 m
- 990 m

85 of 100

262 PU_2015_374

Diffraction of light can be understood by:-

- Wave nature of light
- Particle nature of light
- Wave and particle natures
- Newtons corpuscular theory of light

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276 PU_2015_374

Fission occurs because the average binding energy per nucleon for the fission fragments is higher than that for the original nucleus. The change in binding energy per nucleon is approximately:-

- 0.20 MeV
- 1.0 MeV
- 28 MeV
- 7.0 MeV

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278 PU_2015_374

A triangle is formed by the pair of straight lines $8x^2 - 6xy + y^2 = 0$ and the straight line $2x + 3y = c$. The area of the triangle so formed is equal to 7. Then, the value of c is equal to:-

- $14\sqrt{2}$
- 28
- $28/\sqrt{2}$
- 14

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285 PU_2015_374

The van der Waals equation of state for n -moles of gas, it is given by:-

- $\left(p + \frac{a}{n^2V^2}\right)(V - nb) = nRT$
- $\left(p + \frac{an}{V^2}\right)(V - nb) = nRT$
- $\left(p + \frac{a}{V^2}\right)(V - b) = nRT$
- $\left(p + \frac{an^2}{V^2}\right)(V - nb) = nRT$

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297 PU_2015_374

The minimum value of $f(x) = |3 + x| + |2 + x| + |5 - x|$ where $x \in (-\infty, +\infty)$ is:-

- 0
- 3
- 7
- 10

90 of 100

283 PU_2015_374

The temperature of a gas doubled, then root mean square speed becomes:-

- Half
- $1/\sqrt{2}$ times
- $\sqrt{2}$ times

- Double

91 of 100

263 PU_2015_374

The positive lead of an ohmmeter is connected to the anode of a diode and the negative lead is connected to the cathode. The diode is:-

- The circuit is incomplete.
 Reverse biased
 Forward biased
 Not biased

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260 PU_2015_374

A phase change of π is observed on reflection from:-

- denser to rarer medium
 rarer to denser medium
 rarer and denser medium
 none of these

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279 PU_2015_374

A particle with positive charge q is a distance d from a long straight wire that carries a current i , the particle is travelling with speed v perpendicular to the wire. What is the magnitude of force on the particle if it is moving toward the wire?

- $\frac{\mu_0 i}{4\pi} \left(\frac{qv}{d^2} \right)$
 $\frac{\mu_0 i}{2\pi} \left(\frac{qv}{2d} \right)$
 $\frac{\mu_0 i}{2\pi} \left(\frac{qv}{d} \right)$
 $\frac{\mu_0}{4\pi} \left(\frac{qv}{d} \right)$

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298 PU_2015_374

Let $t = e^x$ and $y = t^2 - 1$. Then, the value of $\left(\frac{d^2 y}{dx^2} \right) \Big|_{x=0}$ is equal to:-

- $\log(4)$
 4

- e^4
- 0

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284 PU_2015_374

The kinetic energy per unit volume of a perfect gas is equals to _____ where P is the pressure of the gas.

- P/2
- P/3
- $\frac{2}{3} P$
- $\frac{3}{2} P$

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282 PU_2015_374

The average *velocity* of the molecule in a gas at equilibrium is:-

- Proportional to T
- Equals to 0
- Proportional to T^2
- Proportional to \sqrt{T}

97 of 100

275 PU_2015_374

The velocity of longitudinal waves passing through a metal rod is proportional to the square root of:-

- Rigidity modulus of the rod.
- Young's modulus of the rod.
- Tension in the rod
- Bulk modulus of the rod

98 of 100

286 PU_2015_374

A solid cube of aluminum of density 2.70g/cm^3 has a volume of 0.200 cm^3 . It is known that 27.0 g of aluminum contains 6.02×10^{23} atoms. How many aluminum atoms are contained in the cube?

- 1.22×10^{22}
- 0.8333×10^{22}
- 1.22×10^{23}
- 0.54×10^{22}

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Evaluate the indefinite integral

$$I = \int \frac{dx}{\sin x + \cos x}.$$

- $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{\pi}{4} + \frac{x}{8} \right) \right| + C$
- $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{\pi}{8} + \frac{x}{2} \right) \right| + C$
- $\sqrt{2} \log \left| \tan \left(\frac{\pi}{8} + \frac{x}{2} \right) \right| + C$
- $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{\pi}{8} - \frac{x}{4} \right) \right| + C$

100 of 100

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Lasing in LASER is due to:-

- Spontaneous emission
- Stimulated emission
- Spontaneous as well as stimulated emission
- Laser radiation