PU M Sc Astro Physics

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187 PU_2015_313
A hydrogen atom is in its ground state when its electron is:-

- in its highest energy level
- in its lowest energy level
- inside the nucleus
- at rest

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102 PU_2015_313

The work done in moving a particle from the point A, with position vector $2\vec{i}-6\vec{j}+7\vec{k}$, to the point B, with position vector $3\vec{i}-\vec{j}-5\vec{k}$, by a force $\vec{F}=\vec{i}+3\vec{j}-\vec{k}$ is:-

- 25
- 28
- 27
- 26

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182 PU_2015_313
A proton and an electron come together to form a hydrogen atom in its ground state. Under the assumption that a single photon is emitted in this process, what is its frequency?

- 0.033×10^{15} Hz
- 0.33×10^{15} Hz
- 33×10^{15} Hz
- 3.3×10^{15} Hz

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105 PU_2015_313
The axis of the parabola $y^2=4x$ is:-

- x=1
- y=0
- y=1
- x=0

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184 PU_2015_313
Wave behavior is exhibited by:-

- only particles at rest
- all particles

- only moving particles
- only charged particles

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180 PU_2015_313

The velocity of the electron in a ground-state hydrogen atom according to Bohr model is:-

- 2.2×10^{6} m/s
- 3.0×10^{8} m/s
- 2.2×10^{7} m/s
- 3.0×10^{6} m/s

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167 PU_2015_313

The existence of electromagnetic waves was confirmed experimentally by:-

- Maxwell
- Planck
- Huygens
- Hertz

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183 PU_2015_313

de Broglie waves can be regarded as waves of:-

- energy
- momentum
- electric charge
- probability

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145 PU_2015_313

The reciprocal of reluctance is known as:-

- Permeance
- Coerecivity
- polarization
- Susceptibility

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163 PU_2015_313

Near-field diffraction implies study of:-

- a) Fresnel diffraction
- b) Fraunhoffer diffraction
- c) both (a) and (b)
- d) neither (a) and (b)

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A simple isolated lattice vacancy is known as:-

- Frenkel defect
- Laue effect
- Schottky defect
- Fink defect

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186 PU_2015_313

According to the uncertainty principle, it is impossible to precisely determine at the same time a particle's:-

- momentum and energy
- charge and mass
- position and momentum
- position and charge

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149 PU_2015_313

Quincke's method is used to find the magnetic susceptibility of:-

- Plasmas
- Solids and Liquids
- Liquids
- Solids

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207 PU_2015_313

If the McLaren's series expansion for $\log_e(1+x)$ is $x-\frac{x^2}{2}+\frac{x^3}{3}-\ldots$ then:-

- $-1 < x < 1$
- $-1 \leq x < 1$
- $-1 < x \leq 1$
- $-1 \leq x \leq 1$

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206 PU_2015_313

An object dropped from the sky follows the law of motion $x=\frac{1}{2}gt^2$ ($g=9.8 m/sec^2$). Then the acceleration of the object:-

- varies as square of distance

- constant as time
- varies as velocity
- varies as time

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144 PU_2015_313

A moving coil galvanometer with a pointer and a scale of 100 divisions has a resistance of 20 ohms and sensitiveness $3x10^{-4}$ amp/div. To make a voltmeter reading up to 50 V, the resistance R of value _____ is connected in _____.

- 1098 Ω, parallel
- 109.8 Ω, series
- 1098 Ω, series
- 109.8 Ω, parallel

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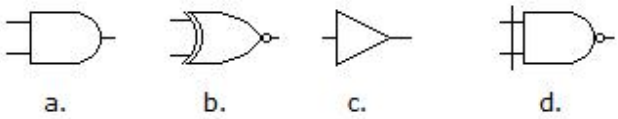
147 PU_2015_313

Which of the figures shown below represents the exclusive-NOR gate?



- c
- a
- d
- b

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123 PU_2015_313

A car undergoes a constant acceleration of $6m/s^2$ starting from rest. In the first second it travels:-

- 3m
- 16m
- 6m
- 36m

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166 PU_2015_313

Polarization of waves can be best understood due to:-

- a) wave nature of light
- b) particle nature of light
- c) both (a) and (b)
- d) dispersion

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208 PU_2015_313

$\int_0^a f(x)dx + \int_0^a f(2a-x)dx$ equal to:-

- $\int_0^{2a} f(x)dx$
- $\int_0^a f(x)dx$
- $2\int_0^a f(x)dx$
- $\int_0^{2a} f(x)dx$

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128 PU_2015_313

The maximum speed of a particle which under goes simple harmonic motion with a period of 0.5s and amplitude of 2cm is:-

- 8πcm/s
- 4πcm/s
- πcm/s
- 2πcm/s

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164 PU_2015_313

Parallel light rays incident at an angle and the glass transparent parallel, slab gets _____ from the original path.

- Diffracted
- dispersed
- deviated
- displaced

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101 PU_2015_313

If $m\vec{i} + 2\vec{j} + \vec{k}$ and $4\vec{i} - 9\vec{j} + 2\vec{k}$ are perpendicular then m is:-

- 12
- -4
- 8
- 4

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200 PU_2015_313
Equivalent matrices are obtained by:-

- Taking inverses
- Taking adjoints
- Taking finite number of elementary transformations
- Taking transposes

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185 PU_2015_313
The velocity of the wave packet that corresponds to a moving particle is:-

- higher than the particle's velocity
- Zero
- equal to the particle's velocity
- lower than the particle's velocity

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168 PU_2015_313
White light illuminates a single slit of width 'x'. The first minimum for red light (λ=650nm) falls at θ =15°
The width 'x' is:-

- 430nm
- 2510nm
- 650nm
- 1255nm

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140 PU_2015_313
The current passing through a solenoid having an inductance L and a resistance R is given by:-

- $i = i_o (R/L)(1-e^{-(R/L)t})$
- $i = i_o (1-e^{-(R/L)t})$
- $i = i_o (1+e^{(R/L)t})$
- $i = i_o (1+e^{-(R/L)t})$

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A particle moves so that its position vector is given by $\mathbf{r}=\cos(\omega t)\mathbf{i}+\sin(\omega t)\mathbf{j}$, where ω is constant. The velocity of the particle **V** is:-

- antiparallel to **r**
- perpendicular to **r**
- zero
- parallel to **r**

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201 PU_2015_313

If $m\vec{i}+2\vec{j}+\vec{k}$ and $4\vec{i}-9\vec{j}+2\vec{k}$ are perpendicular then m is:-

- 8
- 12
- 4
- -4

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146 PU_2015_313
For soft magnetic material susceptibility is:-

- Negative
- Small
- Large
- Zero

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143 PU_2015_313
In the primary circuit of a potentiometer is a storage cell of e.m.f. 2 volts and negligible internal resistance. If the potentiometer wire is 500 cm and its resistance is 5 ohms. The length of the wire required to balance a Daniel cell of e.m.f 1.08 volts is given by:-

- 270 cm
- 0.27
- 2.7 cm
- 27 cm

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160 PU_2015_313
Study of 'Ray Optics' necessarily implies:-

- wavelength and energy of light is insignificant
- phase and energy is significant
- polarization and energy is significant
- wavelength and energy of light is significant

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100 PU_2015_313

The rank of the matrix $\begin{pmatrix} 7 & -1 \\ 2 & 1 \end{pmatrix}$ is:-

- 5
- 9

- 1
- 2

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181 PU_2015_313

To what temperature must a hydrogen sample be heated so that the average molecular energy level equals the binding energy of the hydrogen atom?

- 1.05×10^5 K
- 1.00×10^4 K
- 1.86×10^5 K
- 1.00×10^5 K

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203 PU_2015_313

The equations of the major and minor axes of $\frac{x^2}{9}+\frac{y^2}{4}=1$ are:-

- x=0, y=0
- x=-3, y=-2
- x=3, y=2
- x=8, y=0

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103 PU_2015_313

Cube roots of unity are:-

- $i, \frac{1 \pm i\sqrt{3}}{2}$
- $1, \frac{1 \pm i\sqrt{3}}{2}$
- $i, \frac{-1 \pm i\sqrt{3}}{2}$
- $1, \frac{-1 \pm i\sqrt{3}}{2}$

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161 PU_2015_313

Which of the following is not a third order aberration?

- curvature of field
- astigmatism
- distortion of field
- reflection

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121 PU_2015_313

Two airplanes headed for the same destination leave an airport an hour apart. The one that leaves first travels at 300km/hr and the other travels at 400km/hr. The latter will overtake the former in:-

- 4hr
- 3hr
- 45min
- 80min

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124 PU_2015_313

An object of mass 150g has a velocity v=2**i**+6**j** m/s at a certain instant. Its kinetic energy is:-

- 3.0J
- 12.0J
- 10.0J
- 5J

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205 PU_2015_313

The distance -time relationship of a moving body is given by y=F(t) then the acceleration of the body is the:-

- Gradient of the distance/time graph
- Gradient of the velocity/distance graph
- Gradient of the velocity/time graph
- Gradient of the acceleration/time graph

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127 PU_2015_313

A particle of mass 2 kg moves along the x-axes with an initial velocity 3m/s. A force of F=-6N is applied for period of 3s. Its final velocity is:-

- 12m/s
- 6m/s
- -12m/s
- -6m/s

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109 PU_2015_313

Equation of the tangent to the curve x= cos θ, y= sin θ at $\theta=\frac{\pi}{4}$ is :-

- $x-y+\sqrt{2}=0$
- $x-y-\sqrt{2}=0$
- $x+y+\sqrt{2}=0$

- $x+y-\sqrt{2}=0$

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148 PU_2015_313

An iron rod which is in the form of closed circular ring. If the reluctance of the iron rod is given by $1.92x10^{5}$ amp-turns/Weber. Then the magnetic flux produced by 77 amp-turns is:-

- $4x10^{-4}$ Weber
- $4x10^{4}$ Weber
- $4x10^{-4}$ per Weber
- 4 Weber

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188 PU_2015_313

A photon is emitted by an atom when one of the atom's electrons:-

- leaves the atom
- shifts to a lower energy level
- collides with another of its electrons
- shifts to a higher energy level

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204 PU_2015_313

The equation of the tangent at (-3,1) to the parabola $x^{2}=9y$ is:-

- 3x+2y+3=0
- 2x-3y+3=0
- 2x+3y+3=0
- 3x-2y-3=0

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141 PU_2015_313

A tangent galvanometer was joined in series with a battery and a silver voltmeter. The deflection of the needle was 45° and in the course of an hour the mass of silver deposited was 0.1502 gm. The reduction factor of galvanometer is (e.c.e of silver is 0.00118 gm/C):-

- 2.614
- 0.012
- 0.2614
- 0.0261

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169 PU_2015_313

What is a digital-to-analog converter?

- It stores digital data on a hard drive.
- It allows the use of cheaper analog techniques, which are always simpler.
- It converts direct current to alternating current.
- It takes the digital information from an audio CD and converts it to a usable form.

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125 PU_2015_313

A body undergoes a uniform angular acceleration. In the time t, the number of turns it makes is proportional to:-

- $\sqrt{t}$
- t^3
- t
- t^2

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108 PU_2015_313

The order and degree of the differential equation $\frac{d^3y}{dx^3}+\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{dy}{dx}\right)^5+y=7$ are

- 2,3
- 3,5
- 3,1
- 1,3

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126 PU_2015_313

A 1 kg mass has a potential energy of 1 Joule relative to the ground when it is at a height of:-

- 1m
- 0.102m
- 9.8m
- 32.0m

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106 PU_2015_313

$\int_0^a \sqrt{a^2-x^2}\,dx$ equal to:-

- πa^2
- $\pi a^2/2$
- $2\pi a$
- $\pi a^2/4$

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162 PU_2015_313

According to Fermat's principle of least time, the light ray is going from point A to point B, must traverse a optical path length that is _____ with respect to variation of that path

- maximum
- oscillatory

- minimum
- stationary

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129 PU_2015_313

A car moving at 20m/s along a straight road with its 500Hz horn sounding. You are standing at the side of the road. What frequency will you hear as the car is approaching?

- 531Hz
- 472Hz
- 513Hz
- 500Hz

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202 PU_2015_313

The vector equation of a plane passing through a point where P. V is $\vec{a}$ and perpendicular to vector $\vec{n}$ is:-

- $\vec{r}+\vec{n}=\vec{a}+\vec{n}$
- $\vec{r}-\vec{n}=\vec{a}-\vec{n}$
- $\vec{r}\times\vec{n}=\vec{a}\times\vec{n}$
- $\vec{r}.\vec{n}=\vec{a}.\vec{n}$

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107 PU_2015_313

If n is a positive integer then $\int_0^\infty x^n e^{-ax}dx$ equal to:-

- $\frac{(n+1)!}{a^n}$
- $\frac{n!}{a^n}$
- $\frac{(n+1)!}{a^{n+1}}$
- $\frac{n!}{a^{n+1}}$

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120 PU_2015_313

A vector is solenoidal if:-

- $\nabla^2 \mathbf{xF}$
- $\nabla \mathbf{x} \nabla \mathbf{xF}=0$

- $\nabla . \mathbf{F}=0$
- $\nabla \times \mathbf{F}=0$

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165 PU_2015_313

Mirage effect is due to variation of:-

- the wavelength of light
- the refractive index of the medium
- the energy of light
- fluctuations of the size of the object

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104 PU_2015_313

The value of $e^{\theta} + e^{-\theta}$ is:-

- 2sinhθ
- sinhθ
- coshθ
- 2coshθ

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142 PU_2015_313

Energy is absorbed or liberated as heat when a current flows along an unequally heated conductor depending upon the direction of flow of the current:-

- Peltier effect
- Seebeck effect
- Stark effect
- Thomson effect

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209 PU_2015_313

$\int_0^{\infty} x^5 e^{-4x} dx$ is:-

- $\frac{5!}{4^5}$
- $\frac{6!}{4^5}$
- $\frac{6!}{4^6}$
- $\frac{5!}{4^6}$

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222 PU_2015_313

A bomb of mass 9kg explodes into two pieces of mass 3kg and 6kg. The velocity of 3kg mass is 16m/s. The kinetic energy of 6kg mass particle is:-

- 288J
- 192J
- 1025J
- 96J

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254 PU_2015_313

A stationary pion decays into a muon and a neutrino. The ratio of the energy of the neutrino to the kinetic energy of the muon is:-

- 7.3
- 6.3
- 5.3
- 8.3

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258 PU_2015_313

Using the law of conservation of lepton number, which of the following reactions is possible?

- $p+\bar{\nu} \rightarrow n+e^{+}$
- $n+\nu \rightarrow p+\mu^{-}$
- $p+\bar{\nu} \rightarrow n+\mu^{+}$
- $n+\nu \rightarrow p+\mu+$

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257 PU_2015_313

The quark structure for K^{+} is:-

- $\bar{u}d$
- $u\hat{s}$
- $\bar{u}s$
- $u\hat{d}$

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253 PU_2015_313

If the life time of a neutral pion is 8×10^{-17} sec, then what is the accuracy with which its mass can be determined:-

- 8×10^{-8}
- 7×10^{-8}
- 5×10^{-8}
- 6×10^{-8}

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228 PU_2015_313

Two capillary tubes of different diameter are placed vertically in water. The rise of water is:-

- zero in both
- greater in tube of smaller diameter

- same in both
- greater in tube of larger diameter

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256 PU_2015_313

If two nuclei of masses m_1 and m_2 are fused to form a nucleus of mass m and some energy is released, then:-

- $(m_1 + m_2) > m$
- $(m_1 + m_2) = m$
- $(m_1 + m_2) < m$
- $(m_1 - m_2) = m$

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223 PU_2015_313

A motor car is traveling at 30m/s on a circular road of radius 500m. It is increasing in speed at the rate of $2m/s^2$. Then the acceleration is:-

- $2m/s^2$
- $30m/s^2$
- $2.7m/s^2$
- $1.8m/s^2$

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247 PU_2015_313

The susceptibility of substance is given by $\chi_m = C_m / (T-\theta)$:-

- Poisson's law
- Curie's law
- Ampere's law
- Curie-Weiss Law

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242 PU_2015_313

The thermo electric powers of copper and iron when coupled with lead are 10.8 μV and 3.6 μV respectively at 100°C. The emf developed in an iron-copper couple when the cold and hot junctions are at 50°C and 150°C is:-

- 720 μV
- 72 μV
- 0.72 μV
- 7.2 μV

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246 PU_2015_313

For hard magnetic materials permeability is:-

- Zero
- Large

- Small
- negative

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243 PU_2015_313

The charge sensitivity of a Ballistic galvanometer of period T is given by:-

- T current sensitivity
- (2πT) current sensitivity
- (T/2π) current sensitivity
- (2π/T) current sensitivity

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224 PU_2015_313

If a particle of mass m is moving in a horizontal circular of radius r with a centripetal force -1/r^2, the total energy is:-

- -4/r
- -1/r
- -(1/2)r
- -2/r

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226 PU_2015_313

The weight of the body of mass m at the center of the earth is:-

- mg/2
- 2mg
- mg
- zero

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259 PU_2015_313

Secondary cosmic rays are produced when primary cosmic rays interacts with:-

- photons
- electrons
- positrons
- atmospheric gases

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227 PU_2015_313

A spring of force constant k cut into three equal parts. The force constant of each part is:-

- 2k
- 1k
- 3k
- k/3

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244 PU_2015_313
A galvanometer of resistance 100 ohms is shunted with a resistance to lower its sensitiveness 100 times. The value of shunt resistance is:-

- 10.1 ohms
- 1.01 ohms
- 10 ohms
- 100 ohms

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248 PU_2015_313
An iron rod which is in the form of a closed circular ring consisting of 77 amp-turns produces a flux of $4X10^{-4}$ Weber. Then the reluctance is given by:-

- $1.92x10^{5}$ amp-turns/Weber
- $1.92x10^{5}$ amp-turns
- 1.92 Weber
- $1.92x10^{5}$ Weber/amp-turns

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252 PU_2015_313
Making use of the uncertainty relation, the energy of the localization of a neutron of size one Fermi is:-

- 0.2 Mev
- 0.1 Mev
- 0.3 Mev
- .05 Mev

80 of 100
249 PU_2015_313
Guoy's method is used to find the magnetic susceptibility of:-

- Liquids
- Plasmas
- Solids or liquids
- Solids

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266 PU_2015_313
For a single slit diffraction of width 0.2mm for incident light of wavelength 5000 angstrom, the second minima occurs at:-

- $2.5*10^{-3}$ radians
- $6.2*10^{-3}$ radians
- $5*10^{-3}$ radians
- $3.1*10^{-3}$ radians

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265 PU_2015_313
Deviation in the light path could be due to:-

- scattering
- refraction
- reflection
- all of the above

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264 PU_2015_313
Unpolarized waves can be polarized by:-

- reflection
- polarization
- scattering
- all of the above

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289 PU_2015_313
Which one of the following wave function cannot be a solution of Schrodinger's equation for all values of x?

- $\psi = A\exp(x^2)$
- $\psi = A\sin(x)$
- $\psi = A\sec(x)$
- $\psi = A\exp(-x^2)$

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262 PU_2015_313
Intensity of wave falls as "$1/r^2$", where 'r' is the distance from the source is best described by:-

- ultrasonic waves
- cylindrical waves
- spherical waves
- plane waves

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267 PU_2015_313
Convert the fractional decimal number 6.75 to binary.

- 0110.1010
- 0110.0110
- 0111.1100
- 0110.1100

87 of 100
285 PU_2015_313
An electron with a velocity of 1.5×10^7 m/s has a de-Broglie wavelength of:-

- 9.1×10^{-57} m

- 4.9×10^{-10} m
- 4.9×10^{-11} m
- 6.5×10^{-18} m

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263 PU_2015_313

Intensity of wave falls as "1/r", where 'r' is the distance from the source is best described by:-

- plane waves
- spherical waves
- ultrasonic waves
- cylindrical waves

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268 PU_2015_313

The smallest distance that a microscope objective can be resolved can be obtained by:-

(λ_0 =wavelength, n=refractive index of object space in free space, i= angle which the object modes with the optic axis and the edge of the lens aperture.)

- $0.61\ \lambda_0 / n \sin i$
- $0.61 \sin i / n\ \lambda_0$
- $n \sin i / 0.61\ \lambda_0$
- $n\ \lambda_0 / 0.61 \sin i$

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282 PU_2015_313

A quantum number is not associated with an atomic electron's:-

- mass
- orbital angular momentum
- spin
- energy

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287 PU_2015_313

The de Broglie wavelength of a 10 gram rifle bullet traveling at the velocity of sound 9331 m/s is:-

- 7×10^{-34} m
- 5×10^{-34} m
- 2×10^{-34} m
- 9×10^{-34} m

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281 PU_2015_313

When an atom absorbs a photon of light, which one of the following can happen:-

- no change in the state of any electron
- an electron shifts to a state of smaller principal quantum number
- an X-ray photon is emitted

- an electron shifts to a state of higher principal quantum number

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283 PU_2015_313

The exclusion principle states that no two electrons in an atom can have the same:-

- velocity
- orbit
- spin
- set of quantum numbers

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280 PU_2015_313

The wavelengths in the bright line emission spectrum of an element are:-

- characteristic of the particular element
- the same for all elements
- evenly distributed throughout the visible spectrum
- different from the wavelengths in its dark-line absorption spectrum

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284 PU_2015_313

The operation of the laser is based on which one or more of the following?

- interference of matter waves
- the exclusion principle
- induced emission of radiation
- the uncertainty principle

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260 PU_2015_313

Consider two gratings of 0.5cm side with 5000 lines/cm, the second one is 1.0cm side with 2500 lines/cm. Assuming that both gratings are fully illuminated with incident light, which grating has the sharpest central maximum ?

- No maximum
- The first
- The second
- The gratings have same sharpness

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299 PU_2015_313

A, B and C are inputs of a Full-adder. The sum output of this circuit is:-

- $(A \oplus B)+C$
- A+B+C
- $A \oplus B \oplus C$
- AB+B+AC

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286 PU_2015_313

The kinetic energy of a neutron (mass = 1.675×10^{-22}kg) whose de-Broglie wave length if 2.0×10^{-14} m is:-

- 0.37 eV
- 2.0 MeV
- 3.3×10^{-13} eV
- 0.21 eV

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288 PU_2015_313

How many electrons are there in a closed l=3 sub shell?

- 16
- 14
- 18
- 12

100 of 100

261 PU_2015_313

The phase of the wave described by $y=0.1 \sin((2\pi/0.3)(x-0.1*t))$, (all units are in MKS system) is:-

- $\pi/2$ radians
- π radians
- 2π radians
- 0 radians