122 PU Ph D Physics

1 of 100

171 PU_2016_122_E

Which of the following is the definition of a Hermitian operator considering two arbitrary functions ψ_m and ψ_n

- $(\psi_m, A\psi_n) = -(\psi_n, A\psi_m)^*$
- $(\psi_m, A\psi_n) = (A\psi_n, \psi_m)^*$
- $(\psi_m, A\psi_n) = -(\psi_n, A\psi_m)^*$
- $(\psi_m, A\psi_n) = (\psi_n, A\psi_m)$

2 of 100

170 PU_2016_122_E

An electron moving at a speed of 500 m/s measured with an accuracy of 0.004 %. The certainty with which the position of the electron can be located is :-

- 1.82 m
- 0.0364 m
- 10 m
- 1 m

3 of 100

176 PU_2016_122_E

The possible values total angular momentum resulting from combining three individual angular momenta, $s_1 = 1/2$, $s_2 = 1/2$ and $s_3 = 1/2$ are:-

- (-1, 0, 1)
- (1/2, 1/2, 3/2)
- (1, 0, 1/2)
- (1/2, 1/2, 1/2)

4 of 100

180 PU_2016_122_E

Wave function of a scattered particle for large distances from the scattering potential is given by $\psi(\vec{r}) = \exp(i\vec{k}\vec{r}) + \cos^2\theta \frac{\exp(ikr)}{r}$. What is the total cross section?

- $\frac{4\pi}{5}$
- 0
- $\frac{\pi}{4}$
- $\frac{5\pi}{4}$

5 of 100

200 PU_2016_122_E

The average kinetic energy of a Fermi gas is:-

- $\frac{3}{2}E_F$
- $\frac{2}{3}E_F$
- $\frac{3}{5}E_F$
- $\frac{5}{3}E_F$

6 of 100

178 PU_2016_122_E

The Hermitian conjugate of d/dx (partial) is:-

- -i d/dx
- -d/dx
- d/dx
- i d/dx

7 of 100

174 PU_2016_122_E

For a harmonic oscillator, the probability density at X = 0 is:-

- Decreases exponentially
- Maximum
- Minimum
- Zero

8 of 100

158 PU_2016_122_E

Consider a charged particle moving with a uniform velocity. In a frame which is moving with the same velocity as that of the particle, we have

- Electric field
- Magnetic field
- Both Electric and Magnetic fields
- No Electric or Magnetic fields

9 of 100

154 PU_2016_122_E

An unpolarized light of intensity I_0 passes first through a polarizer and then through an analyzer whose axis of polarization is at angle $\pi/3$ to the axis of the polarizer. The intensity of the light after analyzer is

- $\frac{3I_0}{8}$
- $\frac{I_0}{2}$
- $\pi/2$
- $\frac{I_0}{8}$

10 of 100

183 PU_2016_122_E

An electron-positron pair was created as photons pass through matter. The electron and positron have opposite curvatures in the uniform magnetic field B of 0.2 tesla and each of their radii 'r' is 2.5 x 10-2 m. The energy of the photon is

- 10 MeV
- 3.2 MeV
- 1.6 MeV
- 6.4 MeV

11 of 100

211 PU_2016_122_E

The number of ways in which N identical bosons can be distributed in two energy levels is:-

- N
- $\frac{N(N-1)}{2}$
- N + 1
- $\frac{N(N+1)}{2}$

12 of 100

168 PU_2016_122_E

Four sides of a hollow metallic cube are grounded and the two other sides are insulated from the rest and are held at potential V. The potential at the center of the cube is:-

- V/3
- V
- V/6
- 0

13 of 100

204 PU_2016_122_E

At equilibrium, the Gibbs free energy of a system in contact with a bath at temperature and pressure is:-

- zero
- minimum
- maximum
- infinity

14 of 100

136 PU_2016_122_E

A particle is in motion under central force field defined by $a^2\cos 2\theta = r^2$, where a is constant, r and θ defined coordinates. The force is proportional to:-

- $1/r^5$
- $1/r^3$
- $1/r^7$
- $1/r$

15 of 100

100 PU_2016_122_E

The solution for the differential equation $\frac{dy}{dx} = \frac{1}{x^4}$ is

- $2x^2 + ax + b$
- $3yx^3 = -b$
- $\frac{x^2}{3} + ax + b$
- $x^2 + ax + b$

16 of 100

153 PU_2016_122_E

Consider a point charge q located at the center of a cube. The flux through one of the faces of the cube is:-

- $\frac{q}{\varepsilon_0}$
- $\frac{q}{24\varepsilon_0}$
- $\frac{q}{6\varepsilon_0}$
- $\frac{q}{12\varepsilon_0}$

17 of 100

157 PU_2016_122_E

A wave is incident normally on a good conductor. If the frequency of a plane electromagnetic wave increases four times, the skin depth will:-

- Decrease by a factor of 4
- increase by a factor of 2
- Decrease by a factor of 2
- Remains same

18 of 100

184 PU_2016_122_E

Which of the following wave functions leads to probability density that is oscillatory function of time?

- $\Psi(x) = (\psi_1(x) + \psi_2(x))\, e^{-iEt/\hbar}$
- $\Psi(x) = \psi_1(x) e^{iE_1 t/\hbar} + \psi_2(x) e^{iE_2 t/\hbar}$
- $\Psi(x) = \psi(x) e^{-iEt/\hbar}$
- Probability density is always independent of time

19 of 100

179 PU_2016_122_E

Which of the following statements is correct for an attractive delta function potential ?

- There are no bound states
- There is only one bound state
- There are two bound states
- There are infinite bound states

20 of 100

135 PU_2016_122_E

For a simple harmonic oscillator with spring constant k , defined by coordinates q,p, the value of Poisson bracket [p, H] is:-

- -kq
- 0
- 1
- p

21 of 100

207 PU_2016_122_E

Consider two different systems each with three identical non-interacting particles. Both have single particle states with energies $\varepsilon_0, 3\varepsilon_0, 5\varepsilon_0$, $(\varepsilon_0 > 0)$. One system is populated by spin 1/2 fermions and the other by bosons. Then the difference between the ground state energies of the fermionic and bosonic systems is

- $4\varepsilon_0$
- $2\varepsilon_0$

- ε_0
- $3\varepsilon_0$

22 of 100

185 PU_2016_122_E

The ionization energies (I.E) of H, He and Li are respectively, 13.6 eV, 24.6 eV and 5.4 eV. The reason for the I.E for Li being the least is :-

- Because the Li atom is in excited state most of the time, hence, the electrons of Li form a free electron sea.
- Effective nuclear charge increases and as a result, potential energy increases
- Due to the screening of the nuclear charge by electrons in inner shell and consequently the effective nuclear charge reduces
- Due to the screening of the nuclear charge by electrons, the potential energy increases

23 of 100

182 PU_2016_122_E

If the operator H is hermitian, which of the following is true for the function f(H) = exp(iH) ?

- f(H) is anti-unitary
- f(H) is unitary
- f(H) is anti-hermitian
- f(H) is also hermitian.

24 of 100

152 PU_2016_122_E

Consider the electrostatic energy due to a charged conducting sphere of radius R and charge Q. If the charge is halved and distance is doubled, what happens to electrostatic energy?

- Decreases by eight times
- Increases by four times
- Decreases by four times
- Increases by eight times

25 of 100

160 PU_2016_122_E

Two metallic infinite planes are located at x = ± a. A point charge +q located at x=0 is in equilibrium. If the charge is +q displaced slightly from the origin, the motion of the charge:-

- Remain at the origin
- Executes simple harmonic motion.
- Moves right
- Moves left

26 of 100

137 PU_2016_122_E

Total scattering cross section of a charge particle by an atom of diameter 4.1 nm is approximately:-

- 2 nm
- 16 nm
- 13 nm
- 4 nm

27 of 100

203 PU_2016_122_E

For a rigid magnetic material, the differential form of first law of thermodynamics is:-

- $\left(\frac{\partial T}{\partial M}\right)_S = \left(\frac{\partial S}{\partial B_0}\right)_M$
- $\left(\frac{\partial M}{\partial T}\right)_S = \left(\frac{\partial B_0}{\partial S}\right)_M$
- $\left(\frac{\partial T}{\partial M}\right)_S = -\left(\frac{\partial B_0}{\partial S}\right)_M$
- $\left(\frac{\partial T}{\partial M}\right)_S = \left(\frac{\partial B_0}{\partial S}\right)_M$

28 of 100

150 PU_2016_122_E

Two point charges of charge $+Q$ are located at $x = \pm a$. Another point charge $+q$ located at $x = 0$ is in equilibrium. If the charge $+q$ is displaced slightly from the origin, it executes simple harmonic motion. The period of oscillation $T \propto a^{\beta}$, where β is

- - 2/3
- 2/3
- 3/2
- - 3/2

29 of 100

186 PU_2016_122_E

For a certain atom with atomic number Z = 2, the two electrons be replaced by two spin-1 particles with negative charge. The degeneracy of the ground state is:-

- Infinite
- 3
- 6
- Ground state is non-degenerate

30 of 100

214 PU_2016_122_E

The quantum statistics reduces to classical statistics under which of the following condition.

- $\rho\lambda^3 << 1$
- $\rho\lambda^3 >> 1$
- $\rho\lambda^3 \approx 1$
- $\rho\lambda^3 = 0$

31 of 100

208 PU_2016_122_E

For a particle in a Maxwell-Boltzmann distribution, its most probable speed is:-

- $\sqrt{2mk_BT}$
- $\sqrt{\frac{2mk_B}{T}}$
- $\sqrt{\frac{2mT}{k_B}}$
- $\sqrt{\frac{2k_BT}{m}}$

32 of 100

205 PU_2016_122_E

In low density oxygen gas at low temperature, only the translational and rotational modes of the molecules are excited. The specific heat per molecule of the gas is:-

- $\frac{3}{2}k_B$
- $\frac{5}{2}k_B$
- k_B
- $\frac{1}{2}k_B$

33 of 100

164 PU_2016_122_E

Magnetic field outside an infinite solenoid :-

- varies inversely with distance from the solenoid
- is zero
- varies inversely with square of the distance from the solenoid
- is constant

34 of 100

165 PU_2016_122_E

An electromagnetic field with electric field $\vec{E} = E_0 \cos(\omega t - kz)\hat{i}$ is passing through a disc of radius 2 m. What is the average power in Watt crossing the disc per unit time if $E_0 = 30V/m$?

- 120
- 60
- 30
- 15

35 of 100

212 PU_2016_122_E

If r be the ratio of the probability that the two particles are found in the same state to the probability that two particles belong to different states, then the ratio $r_{MB} : r_{BE} : r_{FD}$ is

- 1:1: 2
- $\frac{1}{2} : 1 : 0$
- $1 : \frac{1}{2} : 0$
- 1: 0: 2

36 of 100

181 PU_2016_122_E

For the constant operator O = a + ib, which of the following is true ?

- $(a-ib)\langle\varphi|\psi\rangle = (a+ib)\langle\varphi|\psi\rangle$
- $\langle(a-ib)\varphi|\psi\rangle = (a-ib)\langle\varphi|\psi\rangle$
- $(a-ib)\langle\varphi|\psi\rangle = \langle\varphi|(a+ib)\psi\rangle$
- $(a-ib)\langle\varphi|\psi\rangle = -\langle\varphi|(a-ib)\psi\rangle$

37 of 100

188 PU_2016_122_E

If the angular momentum of an electron were an integer, the result of Stern-Gerlach experiment as observed on the screen would have been:-

- That the atomic beam would have split into odd number of components
- The atomic beam would not have split, but would have been uniformly distributed on the screen
- That the atomic beam would have into even number of components
- That the atomic beam would have split into exactly three components

38 of 100

175 PU_2016_122_E

The energy needed to turn a magnetic dipole of 1 Bohr magneton from a configuration where it is aligned parallel to the magnetic field of B = 1 tesla, to an anti-parallel configuration with respect to the magnetic field is:-

- 2.32 X 10^{-4} eV
- 1.16 X 10^{-4} eV

- 0.63 X 10^{-4} eV
- 0.58 X 10^{-4} eV

39 of 100

210 PU_2016_122_E

For a system of particles with partition function z , the relation between its average energy and z is:-

- $E = -\frac{\partial z}{\partial \beta}$
- $E = -\frac{\partial \ln z}{\partial \beta}$
- $E = \frac{\partial z}{\partial \beta}$
- $E = \frac{\partial \ln z}{\partial \beta}$

40 of 100

103 PU_2016_122_E

A general solution of the equation $\frac{d^2y}{dt^2} + \omega^2 y = 0$ is (where ω is not equal to zero)

- $y = A\cos\omega t + B\sin\omega t$
- $y = A\cos\omega t - B\sin\omega t$
- $y = A\cos\omega t + B$
- $y = A + B\sin\omega t$

41 of 100

201 PU_2016_122_E

The partition function of a system of harmonic oscillators with energies $E_n = n\hbar\omega,\ n = 0,1,2,...,\infty$ is

- $\frac{1}{\exp\left(\frac{\hbar w}{k_B T}\right) - 1}$
- $\frac{1}{1 - \exp\left(\frac{\hbar w}{k_B T}\right)}$
- $\exp\left(-\frac{\hbar w}{k_B T}\right)$
- $\exp\left(\frac{\hbar w}{k_B T}\right)$

42 of 100

156 PU_2016_122_E
In an iron cored coil the iron core is removed so that the coil becomes an air cored coil. The inductance of the coil will:-

- Increase
- Decrease
- remain same
- initially increase and then decrease

43 of 100

177 PU_2016_122_E
If the ground state energy of the Hydrogen atom is ~ -13.6 eV, ignoring the electron-electron repulsion, the ground state energy of Helium atom is:-

- -3.4 eV
- -109 eV
- -54 eV
- -27.2 eV

44 of 100

161 PU_2016_122_E
What is the equipotential surface corresponding to a line charge of finite length?

- Cylinder
- Ellipsoid
- Cube
- Sphere

45 of 100

202 PU_2016_122_E
At a given temperature, the specific heat at constant volume C_v of a van der Waals gas with a fixed number is particles is:-

- independent of fixed number of particles
- dependent on its volume
- dependent on fixed number of particles
- independent of its volume

46 of 100

167 PU_2016_122_E
A plane electromagnetic wave incident normally on the surface of a material is partly reflected. Measurement on the standing wave in the region in front of the interface show that the ratio of the electric field amplitude at the maxima and minima is 7. The ratio of reflected intensity to the incident intensity is :-

- 3/4
- 9/16

- 4/9
- 4/3

47 of 100

172 PU_2016_122_E

The operator $A\psi(x) = d\psi(x)/dx + 2\ \psi(x)$ is

- Linear
- Unitary
- Anti-linear
- Hermitian

48 of 100

169 PU_2016_122_E

A dielectric sphere of radius R carries a polarization $P = kr^{4}\hat{r}$, where r is the distance from the center and k is constant. The bound volume charge density inside the sphere at a distance r from the center is

- - 4 kR
- - 4 kr^2
- - 4 kr
- - 4 kr^3

49 of 100

209 PU_2016_122_E

Two classical particles have energy states E = 0, ε, 2ε with degeneracies 1, 2, 4 respectively. The total number of configurations possible for this system is:-

- 21
- 18
- 15
- 24

50 of 100

104 PU_2016_122_E

A general solution for the system of equations : $\frac{dy_1}{dt} = y_2$ and $\frac{dy_2}{dt} = y_1$ is

- $y_1 = C_1e^{-t} + C_2e^{t}$ and $y_2 = -C_1e^{t} + C_2e^{t}$
- $y_1 = C_1e^{-t} + C_2e^{t}$ and $y_2 = -C_1e^{-t} + C_2e^{t}$
- $y_1 = C_1e^{-t} + C_2e^{t}$ and $y_2 = C_1e^{-t} + C_2e^{t}$
- $y_1 = C_1e^{t} + C_2e^{t}$ and $y_2 = -C_1e^{-t} + C_2e^{t}$

51 of 100

213 PU_2016_122_E

For a simple harmonic oscillator, the average energy in three dimensions is:-

- $k_B T$
- $\frac{3}{2} k_B T$
- $\frac{2}{3} k_B T$
- $3 k_B T$

52 of 100

206 PU_2016_122_E

A random walker takes a step of unit length in the positive direction with probability 2/3 and a step of unit length in the negative direction with probability 1/3. The mean displacement of the walker after n steps is:-

- n / 2
- n / 3
- 0
- 2n / 3

53 of 100

162 PU_2016_122_E

Gauss's law cannot be used to obtain the electric field for which of the following sources?

- A point charge
- A conducting sphere
- An infinite line charge
- A finite surface charge

54 of 100

173 PU_2016_122_E

If H is the free-particle Hamiltonian, then the commutator : [x, [x, H]] =

- $\frac{\hbar^2}{m}$
- $-\frac{\hbar^2}{2m}$
- $\frac{\hbar^2}{2m}$
- $-\frac{\hbar^2}{m}$

55 of 100

101 PU_2016_122_E

The solution for the differential equation $\frac{dy}{dx} = \frac{xy}{2}$ is

- Ce^{x^2}
- $Ce^{x^{-2}/4}$
- $Ce^{x^2/2}$
- $Ce^{x^2/4}$

56 of 100

102 PU_2016_122_E

The exact solution for the differential equation $\frac{dy}{dx} = 1 + y^2,\ y(0) = 0$ is

- y = tanh x
- y = cosh x
- y = cos x
- y = tan x

57 of 100

166 PU_2016_122_E

Consider an infinite metallic plane grounded at z=0. A charge q is placed at (0,0,d), the electric field at (0,0,-d) is

- Zero
- $\frac{q}{16\pi\varepsilon_0 d^2}$
- Infinity
- $\frac{q}{4\pi\varepsilon_0 d^2}$

58 of 100

151 PU_2016_122_E

Consider a wedge, where β is the angle of the wedge. If a charge q is placed on the surface of the wedge, for which of the following values of β, the charge density at the corner of the wedge is maximum?

- $\pi/6$
- $\pi/2$
- π
- $3\pi/2$

59 of 100

163 PU_2016_122_E

Which of the following Maxwell's equation signifies the non-existence of magnetic monopole?

- $\nabla . \vec{E} = \frac{\rho}{\varepsilon_0}$
- $\nabla . \vec{B} = 0$
- $\nabla \times \vec{B} = \mu_0 \vec{J} + \mu_0 \varepsilon_0 \frac{\partial \vec{E}}{\partial t}$
- $\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$

60 of 100

159 PU_2016_122_E

Which of the following is a source of electromagnetic radiation?

- An accelerating charge
- A charge in uniform motion
- A charged sphere
- A charge at rest

61 of 100

254 PU_2016_122_M

In Debye's theory of Specific heat of solids, the frequency of vibrations of the lattice has:-

- A continuous spectrum up to a finite value
- An infinite discrete spectrum
- A discrete spectrum up to a finite value
- An infinite continuous spectrum

62 of 100

238 PU_2016_122_M

The first Brillouin zone of a Body centered cubic crystal lattice is:-

- Body centered cubic
- Simple Cubic
- Rhombic dodecahedron
- Truncated octahedron

63 of 100

252 PU_2016_122_M

At frequencies around 5 * 10^{14}Hz, the ionic polarization becomes:-

- 1
- Zero
- Infinite

- Negative

64 of 100

232 PU_2016_122_M

A molecule makes a transition between the ground state and excited state. The uncertainity in time of upper state is Δ t, then the width of spectral line is given by:-

- $\frac{1}{2\pi.\Delta t}$
- $\frac{1}{2\pi\nu\Delta t}$
- $\frac{\nu}{2\pi.\Delta t}$
- $\frac{h}{2\pi.\Delta t}$

65 of 100

242 PU_2016_122_M

Which of the following crystallographic symmetry is necessary for the material to show spontaneous polarization (Ferroelectric):-

- Centro symmetric
- Non- Centro symmetric
- Space inversion symmetry
- Time reversal symmetry

66 of 100

247 PU_2016_122_M

The Fermi level of an intrinsic semiconductor lies near the middle of the forbidden gap but for an n-type semiconductor it is nearer the :-

- Valance band
- As like intrinsic semiconductor
- Conduction band
- Above the Conduction band

67 of 100

226 PU_2016_122_M

The bond between two atoms are elastic in nature where μ is the reduced mass, r is the bond length and k is the force constant. Then the centrifugal distortion constant can be defined as:-

- $\frac{h^3}{32\pi^4\mu^2r^6ck}$
- $\frac{h}{32\pi^4\mu^2r^6ck}$

- $\frac{h^3}{32\pi\mu^2 r^6 ck}$
- $\frac{h^3}{32\pi^4 \mu r^6 ck}$

68 of 100

241 PU_2016_122_M

The Meissner effect of a bulk metal in the superconducting state indicates the magnetic nature of the material is as a:-

- Diamagnetic
- Paramagnetic
- Ferromagnetic
- Anti-ferromagnetic

69 of 100

227 PU_2016_122_M

An NMR spectrum of methyl formate taken on a 60 MHz spectrometer exhibit a chemical shift 8 ppm. Then NMR signal frequency in terms of Hz is :-

- 180Hz
- 480 Hz
- 60 Hz
- 120 Hz

70 of 100

246 PU_2016_122_M

The magnetic susceptibility of a Diamagnet is directly proportional to:-

- The square of the average atomic radius
- Inversely proportional to the Temperature
- The volume of the substance
- Directly proportional to the Temperature

71 of 100

231 PU_2016_122_M

The selection rule for a transition to observe in EPR spectra for system in triplet states is:-

- Δ ms =0, ± 1 and ± 2
- Δ ms = 0 and ± 1
- Δ ms = $\pm 1, \pm 2$....
- Δ ms = ± 1 and ± 2

72 of 100

234 PU_2016_122_M

In X-ray spectra v is the frequency, Z is atomic number and σ is the screening constant, then according to Mosley's law v is defined as:-

- $\nu \propto (Z-\sigma)^2$
- $\nu \propto \frac{1}{(Z-\sigma)}$
- $\nu \propto \sqrt{(Z-\sigma)}$
- $\nu \propto (Z-\sigma)^4$

73 of 100

256 PU_2016_122_M

The fact that the binding energy per nucleon is roughly a constant over most of the range of stable nuclei is a consequence of the fact that the nuclear force is :-

- long range
- short range.
- weak
- strong.

74 of 100

248 PU_2016_122_M

Which is of the following indicates the range of first Brillouin zone:-

- $0 < k < 2\pi/a$
- $\pi/a < k < 2\pi/a$
- $-2\pi/a < k < 2\pi/a$
- $-\pi/a < k < \pi/a$

75 of 100

237 PU_2016_122_M

For which of the unit cell, the maximum packing fraction can be obtained:-

- Simple cubic
- Body centered cubic
- Primitive cell
- Face centered cubic

76 of 100

236 PU_2016_122_M

The Intensity of the X-Ray peaks in X-ray Diffractogram related to:-

- The scattering from positive charges
- Crystal structure
- Form factor of the free atoms
- The weight of the substance

77 of 100

244 PU_2016_122_M

Which phenomena is responsible for experimentally achieving the low-temperatures up to milli Kelvin in paramagnetic substances?

- Adiabatic Magnetization
- Adiabatic Demagnetization
- Using Liquid Helium bath
- Closed Cycle Refrigeration

78 of 100

251 PU_2016_122_M

Point defects in a crystal constitutes of :-

- Vacancies
- Interstitial atoms
- Impurity atoms
- Vacancies, Impurity atoms & Interstitials

79 of 100

257 PU_2016_122_M

A particle moves in such a way that its kinetic energy just = its rest energy. The velocity of this particle is:-

- c/4
- c
- 0.866c
- 0.707c

80 of 100

224 PU_2016_122_M

The recoil velocity of free Mossbauer nucleus is 36.98 ms^{-1} while emitting a γ -ray of wavelength of 0.1 nm. Then the Doppler shift observed is:-

- 39.68 x 10^{-10} hertz
- 3.968 x 10^{10} hertz
- 3.968 x 10^{-10} hertz
- 39.68X 10^{10} Hertz

81 of 100

290 PU_2016_122_D

A Zener diode can be used as:-

- a.c. voltage regulator only
- Circuit breaker
- d.c. voltage regulator only

- Both a.c. and d.c. voltage regulator

82 of 100

275 PU_2016_122_D

The approximate energy gap between valence band and conduction band of an insulator and a metal are respectively _____

- 15.0 eV & 5.0 eV
- 5.0 eV & 0.0 eV
- 1.1 eV & 15.0 eV
- 15.0 eV & 1.1 eV

83 of 100

289 PU_2016_122_D

In TV transmission, sound signal is:-

- Phase modulated
- Frequency modulated
- Amplitude modulated
- Phase modulated and Amplitude modulated

84 of 100

278 PU_2016_122_D

A transistor with β =50 and base current I_B= 20mμA; the emitter current I_E = to _____

- 1.02 mA
- 0.02 mA
- 102 mA
- 10.2 mA

85 of 100

271 PU_2016_122_D

The energy released by the nuclear bomb that destroyed Hiroshima was equivalent to 12.4 kilotons of TNT. This is equivalent to 9.0 10^{26} MeV. The mass that was converted into energy in this explosion was:

- 1.6 kg
- 1.6 10^{-3} kg
- 1.4 10^{14} kg
- 1.1 10^{10} kg

86 of 100

293 PU_2016_122_D

Which of the expression is NOT correct according to Boolean theorem?

- A+A = 2A
- A+0 = A

- A+A = A
- A.1 = A

87 of 100

277 PU_2016_122_D

A light emitting diode (LED) producing GREEN light, is made of:-

- Gallium Arsenide
- Gallium Phosphide
- Pure Silicon
- Pure Germanium

88 of 100

262 PU_2016_122_D

Lists the four known types of forces in nature in order of their decreasing strength?

- strong nuclear, gravitational, weak nuclear, electromagnetic.
- electromagnetic, strong nuclear, weak nuclear, gravitational.
- strong nuclear, weak nuclear, electromagnetic, gravitational
- strong nuclear, electromagnetic, weak nuclear, gravitational.

89 of 100

276 PU_2016_122_D

A resistor in connected in series with Zener diode in the circuit to _____

- to protect the load
- to protect Zener
- increase current
- decrease current

90 of 100

279 PU_2016_122_D

A transistor is connected such that base-emitter junction is forward biased and base-collector junction is reversed biased. Which of the following statement is correct ?

- This type of connection is not valid for any transistor
- The transistor is an n-p-n transistor
- The transistor is an p-n-p transistor
- This type of connection is valid for all transistor

91 of 100

263 PU_2016_122_D

The conservation law violated by the reaction $p \rightarrow \pi^0 + e^+$ is the conservation of:-

- linear momentum.

- lepton number and baryon number.
- energy.
- charge.

92 of 100

265 PU_2016_122_D

According to Hubble's law, the age of the universe is :-

- approximately 6000 years
- less than 6000 years.
- between 10 and 15 billion years.
- roughly 1 billion years.

93 of 100

260 PU_2016_122_D

The interaction that describes the forces among nucleons that hold nuclei together is:-

- the leptonic interaction.
- the gravitational interaction.
- the hadronic interaction
- the electronic interaction.

94 of 100

273 PU_2016_122_D

In quantum electrodynamics (QED), electromagnetic forces are mediated by :-

- exchange of virtual photons.
- hadrons.
- Z bosons
- Gluons.

95 of 100

274 PU_2016_122_D

Maximum power is transferred from a source with internal resistance r to a load with resistance R when

_____

- r = 4R
- r = R/2
- r = 2R
- r = R

96 of 100

261 PU_2016_122_D

The following fusion reaction occurs in the sun:

$^{3}He_{2} + {}^{4}He_{2} \rightarrow {}^{7}Be_{4}$

The masses of the nuclei are ^{3}He = 3.016 049 a.m.u; ^{4}He = 4.002 604 a.m.u; ^{7}Be = 7.016 930 a.m.u. The energy released or absorbed by the reaction is

- 1.6 MeV, absorbed
- 1.6 MeV, released
- 920 MeV, absorbed
- 920 MeV, released

97 of 100

292 PU_2016_122_D

An UJT has _____

- No junctions
- Three pn junction
- Two pn junctions
- One pn junction

98 of 100

280 PU_2016_122_D

A carrier wave of 500W is subjected to 100% amplitude modulation, the total power of modulated wave is:-

- 100 W
- 500 W
- 250 W
- 750 W

99 of 100

291 PU_2016_122_D

If reverse bias on the gate of JEFET is increased, then the width of conducting channel _____

- It increases near the drain and decreases near the source
- Increased
- Is decreased
- Remains constant

100 of 100

264 PU_2016_122_D

The reaction $\mu^{-} \rightarrow e^{-}$ + anti $\nu_e + \nu_\mu$ conserves:-

- muon lepton number but not electron lepton number.
- both muon and electron lepton numbers.

- electron lepton number but not muon lepton number.
- neither muon lepton nor electron lepton number.