DU MSc Physics

Topic:- PHY MSC

1) A satellite is revolving round the earth at a height of 600 km. Calculate the time period of the satellite (Radius of the earth is 6400 Km and mass of the earth is 6×10^{24} Kg)

[Question ID = 101]

1. $7 \times 10^3 s$

   [Option ID = 401]
2. $5.8 \times 10^2 s$

   [Option ID = 402]
3. $7.0 \times 10^2 s$

   [Option ID = 403]
4. $5.8 \times 10^3 s$

   [Option ID = 404]

2) A particle moves in the X-Y plane according to the following conditions: $x = Rsin(\omega t) + \omega Rt, \quad y = Rcos(\omega t) + R$, where ω *and* R are constants. The maximum speed of the particle is

[Question ID = 102]

1. $v = \omega R\sqrt{2}$

   [Option ID = 405]
2. $v = 2\omega R$

   [Option ID = 406]
3. $v = \omega R$

   [Option ID = 407]
4. $v = 2\sqrt{2}\,\omega R$

   [Option ID = 408]

3) A nuclear explosion releasing energy E creates a shockwave in the atmosphere with initial density ρ. A possible approximate value of radius R of the wave-front at time t is given as

[Question ID = 103]

1. $R = \left(\frac{Et^2}{\rho}\right)^{1/2}$

   [Option ID = 409]
2. $R = \left(\frac{Et^2}{\rho}\right)^{1/3}$

   [Option ID = 410]
3. $R = \left(\frac{Et^2}{\rho}\right)^{1/4}$

   [Option ID = 411]
4. $R = \left(\frac{Et^2}{\rho}\right)^{1/5}$

   [Option ID = 412]

4) A particle of mass m_1 is moving along the x-axis with velocity u_1 and another particle of mass m_2 is at rest at the origin. The two particles undergo elastic collision and start moving with velocities v_1 and v_2 Which one of the following expressions is correct?

[Question ID = 104]

1. $\frac{m_2}{m_1} = 1 - \frac{2v_1}{v_2}$

   [Option ID = 413]
2. $\frac{m_2}{m_1} = 1 + \frac{2v_1}{v_2}$

   [Option ID = 414]

3. $\frac{m_2}{m_1} = 1 - \frac{v_1}{v_2}$

[Option ID = 415]

4. $\frac{m_2}{m_1} = 1 + \frac{v_1}{v_2}$

[Option ID = 416]

5) A particle of mass *m* is moving along a circle of radius r_o in a horizontal plane with speed v_o as it is connected to the center of the circle through an inextensible string. The other end of the string is being pulled down through a vertical tube at a slow rate resulting in the gradual reduction in the radius of the circular orbit of the particle from its initial value r_o. The work done by the pulling force in reducing the radius from r_o to r is

[Question ID = 105]

1. $W = \frac{1}{2} m v_0^2 \left(\frac{r_0^2}{r^2} - 1 \right)$

[Option ID = 417]

2. $W = \frac{1}{2} m v_0^2 \left(\frac{r_0^2}{r^2} + 1 \right)$

[Option ID = 418]

3. $W = \frac{1}{2} m v_0^2 \left(\frac{r^2}{r_0^2} - 1 \right)$

[Option ID = 419]

4. $W = \frac{1}{2} m v_0^2 \left(\frac{r^2}{r_0^2} + 1 \right)$

[Option ID = 420]

6) The probability of finding a moving particle in the n = 3 state in a one dimensional box with potential

$$V(x) = \begin{cases} 0 & for\ 0 < x < a \\ \infty & \text{elsewhere} \end{cases},$$

in the region $\frac{a}{3} < x < \frac{2a}{3}$ is

[Question ID = 106]

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

[Option ID = 421]

2. $\frac{1}{6}$

[Option ID = 422]

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

[Option ID = 423]

4. 0

[Option ID = 424]

7) Complex conjugate of the derivative operator $\frac{d}{dx}$ is

[Question ID = 107]

1. $-\frac{d}{dx}$

[Option ID = 425]

2. $i\frac{d}{dx}$

[Option ID = 426]

3. $i\hbar\frac{d}{dx}$

[Option ID = 427]

4. $-i\hbar\frac{d}{dx}$

[Option ID = 428]

8)

A particle is moving in a one-dimensional potential $V(x)$. If $V(x)$ has an infinite discontinuity at $x = x_0$, the wave function for the particle, at that point

[Question ID = 108]

1. has a finite discontinuity

   [Option ID = 429]
2. is continuous but not differentiable

   [Option ID = 430]
3. is differentiable

   [Option ID = 431]
4. has infinite discontinuity

   [Option ID = 432]

9) For a normalized wave-function $\psi(x) = A\, exp\left(\frac{-x^2}{2\sigma^2}\right)$ the uncertainty in the position, Δx is

[Question ID = 109]

1. $\frac{\sigma}{\sqrt{2}}$

   [Option ID = 433]
2. σ

   [Option ID = 434]
3. $\sigma\sqrt{2}$

   [Option ID = 435]
4. 2σ

   [Option ID = 436]

10) A beam of monochromatic light of frequency v, intensity I and linearly polarized in the vertical plane consists of n photons per unit time. It is passed through a polarizer whose pass angle is 45° to the vertical. The emerging light has

[Question ID = 110]

1. (n/2) photons of frequency v and polarized along the vertical plane

   [Option ID = 437]
2. n photons of frequency (v/2) and polarized along the vertical plane

   [Option ID = 438]
3. (n/2) photons of frequency v and polarized along the plane 45° to the vertical.

   [Option ID = 439]
4. n photons of frequency v and polarized along the plane 45° to the vertical.

   [Option ID = 440]

11) The decimal equivalent of the binary number 10111.0110 is given by

[Question ID = 111]

1. $(23.1875)_{10}$

   [Option ID = 441]
2. $(23.375)_{10}$

   [Option ID = 442]
3. $(46.375)_{10}$

   [Option ID = 443]
4. $(46.1875)_{10}$

   [Option ID = 444]

12) In a npn transistor, 90% of the emitted electrons reach the collector. If the collector current is 18 mA, the base current (in mA) will be

[Question ID = 112]

1. 1.62

   [Option ID = 445]
2. 1.8

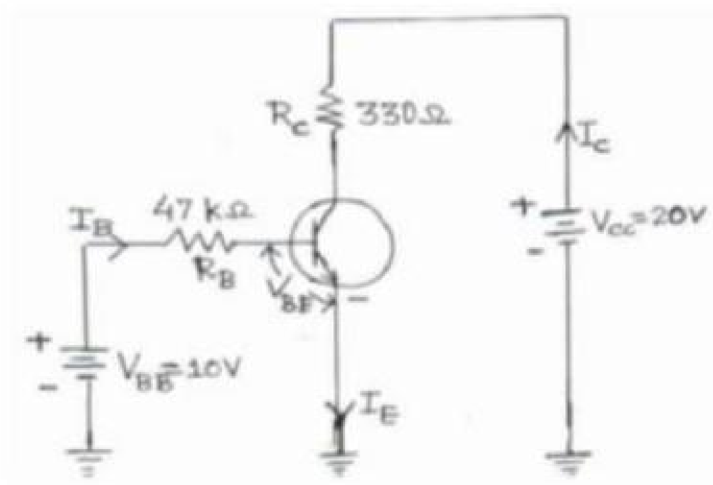
   [Option ID = 446]
3. 2.0

   [Option ID = 447]
4. 2.5

   [Option ID = 448]

13) Value of the Q point : (I_c, V_{CE}) of the following transistor circuit is given by:

(Take $\beta = 200,\ V_{BE} = 0.7\ V$)



[Question ID = 113]

1. $I_c = 39.6\ mA, V_{CE} = 6.93\ V$

   [Option ID = 449]
2. $I_c = 45.5\ mA, V_{CE} = 4.98\ V$

   [Option ID = 450]
3. $I_c = 39.6\ mA, V_{CE} = 0.693\ V$

   [Option ID = 451]
4. $I_c = 4.5\ mA, V_{CE} = 4.98\ V$

   [Option ID = 452]

14) In an amplitude modulated wave with maximum peak-to-peak voltage of 20 mV and minimum peak-to-peak voltage of 4 mV, the percentage modulation is

[Question ID = 114]

1. 66.7%

   [Option ID = 453]
2. 50%

   [Option ID = 454]
3. 15%

   [Option ID = 455]
4. 77%

   [Option ID = 456]

15) For an applied forward bias of 0.2 V in a germanium diode with reverse saturation current I_o = 1μA, the static and dynamic resistance at 27 °C, respectively is

[Question ID = 115]

1. 88 Ω and 11.4 Ω

   [Option ID = 457]
2. 114 Ω and 88 Ω

   [Option ID = 458]
3. 8.8 kΩ and 1.14 kΩ

   [Option ID = 459]
4. 8.8 Ω and 1.14 Ω

   [Option ID = 460]

16)

A 3D isotropic harmonic oscillator has energy levels, $\varepsilon_{n_1 n_2 n_3} = \hbar\omega\left(n_1 + n_2 + n_3 + \frac{3}{2}\right)$, where $n_1, n_2, n_3 = 0,1,2, \ldots$. The number of microstates corresponding to the energy $\varepsilon = \frac{7}{2}\hbar\omega$ is

[Question ID = 116]

1. 6

   [Option ID = 461]
2. 3

   [Option ID = 462]
3. 4

   [Option ID = 463]
4. 8

   [Option ID = 464]

17) What will be the solution of the following differential equation:

$$(\sin x)\frac{dy}{dx} + (\cos x)\, y = x^2; \;\; y(0) = 1$$

[Question ID = 117]

1. $y(x) = \dfrac{x^3}{3\sin x}$

   [Option ID = 465]
2. $y(x) = \dfrac{x^3 \sin x}{3}$

   [Option ID = 466]
3. $y(x) = \dfrac{x^3 \cos x}{3}$

   [Option ID = 467]
4. $y(x) = \dfrac{x^3}{3\cos x}$

   [Option ID = 468]

18) What is the series expansion and region of convergence of the function $f(z) = \frac{1}{z+1}$ about $z_0 = \frac{1}{2}$?

[Question ID = 118]

1. $f(z) = \frac{1}{2}\sum_{n=0}^{\infty}\left[-\frac{1}{2}(z-\frac{1}{2})\right]^n; \; \left|z-\frac{1}{2}\right| < \frac{1}{2}$

   [Option ID = 469]
2. $f(z) = \sum_{n=0}^{\infty}[-z]^n; \; |z| < 1$

   [Option ID = 470]
3. $f(z) = \frac{2}{3}\sum_{n=0}^{\infty}\left[-\frac{2}{3}(z-\frac{1}{2})\right]^n; \; \left|z-\frac{1}{2}\right| < \frac{3}{2}$

   [Option ID = 471]
4. $f(z) = 2\sum_{n=0}^{\infty}\left[-2(z+\frac{1}{2})\right]^n; \; \left|z-\frac{1}{2}\right| < \frac{1}{2}$

   [Option ID = 472]

19) **Evaluate the Integral** $I = \int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$

[Question ID = 119]

1. $I = \dfrac{2\pi\sqrt{3}}{3}$

   [Option ID = 473]
2. $I = 0$

   [Option ID = 474]
3. $I = \dfrac{2\pi\sqrt{3}}{2}$

   [Option ID = 475]
4. $I = \dfrac{\pi\sqrt{3}}{2}$

   [Option ID = 476]

20) What is the expectation value of the linear momentum squared, i.e. $\langle p_x^2\rangle$ for the wave function $\psi(x) = \sqrt{k}e^{-k|x|}$; k being a real constant

[Question ID = 120]

1. $\langle p_x^2\rangle = \hbar^2 k^2$

   [Option ID = 477]
2. $\langle p_x^2\rangle = -\hbar^2 k^2$

   [Option ID = 478]
3. $\langle p_x^2\rangle = 2\hbar^2 k^2$

   [Option ID = 479]
4. $\langle p_x^2\rangle = -2\hbar^2 k^2$

   [Option ID = 480]

21)

A sphere of radius R carries a volume charge density, $\rho = kr$ where k is a constant and $0 < r < R$. The energy of the configuration (in S.I. units) is given by

[Question ID = 121]

1. $\frac{\pi k^2 R^7}{7\epsilon_0}$

   [Option ID = 481]
2. $\frac{k^2 R^8}{16\epsilon_0^2}$

   [Option ID = 482]
3. $\frac{k^2 R^7}{7\epsilon_0}$

   [Option ID = 483]
4. $\frac{\pi k^2 R^8}{16\epsilon_0}$

   [Option ID = 484]

22) A point charge q is embedded at the center of a sphere of linear dielectric material with susceptibility χ_e and radius R. The electric field and polarization at a point $r < R$ in S.I. units would then be

[Question ID = 122]

1. 1

   [Option ID = 485]
2. 2

   [Option ID = 486]
3. 3

   [Option ID = 487]
4. 4

   [Option ID = 488]

23)

A linearly polarized electromagnetic wave $E = E_o exp(-i(k \cdot r - \omega t))$ is travelling in vacuum.

The root mean square value of the displacement current density for $|E_o| = 5.1 \times 10^{-3}$ V m^{-1} at a frequency $\omega = 1$ GHz is

[Question ID = 123]

1. 2×10^{-4} A m^{-2}

   [Option ID = 489]
2. 2.8×10^{-4} A m^{-2}

   [Option ID = 490]
3. 2×10^{4} A m^{-2}

   [Option ID = 491]
4. 2.8×10^{4} A m^{-2}

   [Option ID = 492]

24) Consider a sphere carrying an electric polarization $\vec{P} = 3\epsilon_o r^2 \hat{r}$, where r denotes the radial distance from the center. The electric field inside the sphere is

[Question ID = 124]

1. $\vec{E} = -4r^2\hat{r}$

   [Option ID = 493]
2. $\vec{E} = -3r^3\hat{r}$

   [Option ID = 494]
3. $\vec{E} = -\frac{2}{3}r^2\hat{r}$

   [Option ID = 495]
4. $\vec{E} = -\frac{4}{3}r^3\hat{r}$

   [Option ID = 496]

25) Let the electric field due to a spherical distribution of charge be given by, $\vec{E} = E_o(1 - 3e^{-\alpha r})\frac{\hat{r}}{r}$ ...ere E_o and

α are constants, and r denotes the radial distance from the center of the sphere. The corresponding charge density would be minimum

[Question ID = 125]

1. $r = 2/\alpha$

   [Option ID = 497]
2. $r = 2\alpha/\sqrt{3}$

   [Option ID = 498]
3. $r = \sqrt{3}\,\alpha$

   [Option ID = 499]
4. $r = 1/\alpha$

   [Option ID = 500]

26) A finite conductor is made up of a metal of permittivity ϵ . For a uniform conductivity σ, the volume charge density would evolve with time as

[Question ID = 126]

1. $\rho \propto e^{-\sigma t/\epsilon}$

   [Option ID = 501]
2. $\rho \propto e^{-\epsilon t/\sigma}$

   [Option ID = 502]
3. $\rho \propto e^{-\sigma t^2/\epsilon}$

   [Option ID = 503]
4. $\rho \propto e^{-\epsilon t^2/\sigma}$

   [Option ID = 504]

27)

Consider a simple cubic lattice with (lattice constant = a) in an X-ray diffraction experiment. Suppose the wavelength of the incident X-rays is related to the lattice constant as $\lambda = \frac{a}{2\sqrt{3}}$. The second order Bragg diffraction from (111) planes appears at θ. Any small change in the lattice constant Δa would result in a small change in the Bragg angle $\Delta\theta$. $\frac{\Delta\theta}{\Delta a}$ =

[Question ID = 127]

1. $\frac{-1}{a\sqrt{2}}$

   [Option ID = 505]
2. $\frac{1}{a\sqrt{3}}$

   [Option ID = 506]
3. $\frac{-1}{a\sqrt{3}}$

   [Option ID = 507]
4. $\frac{-2}{a\sqrt{15}}$

   [Option ID = 508]

28) An ionic solid is in thermal equilibrium at temperature T. In order to maintain the charge neutrality, vacancy defects are created in pairs (+ and - ions). N is the number of molecules (each containing a pair of oppositely charged ions) per unit volume and n is the number of vacancies per unit volume. Which statement is true about the plot of $ln\left(\frac{n}{N}\right)$ as a function of T.

[Question ID = 128]

1. It is a straight line.

   [Option ID = 509]
2. It is a hyperbolic curve

   [Option ID = 510]
3. It is a logarithmic curve.

   [Option ID = 511]
4. It is an exponential curve

   [Option ID = 512]

29) **Consider a two dimensional sheet of metal in thermal equilibrium at the room temperature (300 K). The sheet resistivity is 3.55 ohm and the surface density of electrons is 10^{21} /m^2 . Following Drude's theory for the collisions of electrons in the metal, the mean free path of an electron would be close to [Given, $k_B = 1.38 \times 10^{-23}$ J/K , $m = 9.11 \times 10^{-31} Kg$, and $e = 1.6 \times 10^{-19}$C]**

[Question ID = 129]

1. 95 Å

   [Option ID = 513]
2. 9.5 Å

   [Option ID = 514]
3. 950 Å

   [Option ID = 515]
4. 0.95 Å

   [Option ID = 516]

30) **For a doped semiconductor, μ_h and μ_e represent the hole and electron mobilities respectively. If n_i represents the intrinsic carrier density,then at a given temperature the required electron concentration at which the resistivity becomes maximum is given by,**

[Question ID = 130]

1. n_i

   [Option ID = 517]
2. $n_i \frac{\mu_e}{\mu_h}$

   [Option ID = 518]
3. $n_i \sqrt{\frac{\mu_h}{\mu_e}}$

   [Option ID = 519]
4. $n_i \sqrt{\frac{\mu_e}{\mu_h}}$

   [Option ID = 520]

31) **What will be the proton separation energy of ^{197}Au. (Given mass of ^{197}Au= 196.966552 amu, mass of ^{196}Pt = 195.9649 amu)**

[Question ID = 131]

1. 4.22 MeV

   [Option ID = 521]
2. 5.44 MeV

   [Option ID = 522]
3. 3.66 MeV

   [Option ID = 523]
4. 7.28 MeV

   [Option ID = 524]

32) **What will be the Q-value (energy release) when a Λ particle decays to a proton and a pion (Λ -> pπ^-) (rest mass of Λ = 1115.6 MeV/c^2). [Take π^- rest mass = 139.6 MeV/c^2].**

[Question ID = 132]

1. 32.5 MeV

   [Option ID = 525]
2. 37.7 MeV

   [Option ID = 526]
3. 39.8 MeV

   [Option ID = 527]
4. 42.5 MeV

   [Option ID = 528]

33) **Any nucleus emitting an alpha particle followed by two beta negative decays is**

[Question ID = 133]

1. an isotope of the original one.

   [Option ID = 529]
2. an isotone of the original one.

   [Option ID = 530]

3. an isobar of the original one.

[Option ID = 531]

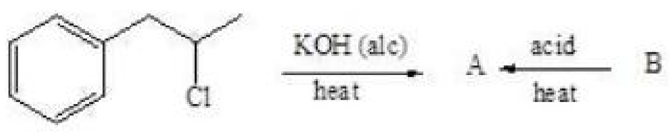
4. an isomer of the original one.

[Option ID = 532]

34) The strong nuclear force between the nucleons present inside the nucleus is[Question ID = 134]

1. charge dependent. [Option ID = 533]
2. spin dependent. [Option ID = 534]
3. both charge and spin dependent. [Option ID = 535]
4. spin dependent but charge independent. [Option ID = 536]

35) A scalar meson decays into three pseudo scalar mesons. The decay happens through



[Question ID = 135]

1. weak interaction

[Option ID = 537]

2. strong interaction

[Option ID = 538]

3. electromagnetic interaction

[Option ID = 539]

4. gravitational interaction

[Option ID = 540]

36) Which of the following statements about the reaction $p + p \rightarrow p + p + p + \overline{p}$ is wrong?

[Question ID = 136]

1. Baryon number is conserved.

[Option ID = 541]

2. Electric charge is conserved.

[Option ID = 542]

3. The reaction is allowed only if the incident protons have energy greater than a particular threshold.

[Option ID = 543]

4. The reaction is not allowed because the conservation of (rest) mass is violated.

[Option ID = 544]

37) A string AB of length $2l$ is tied between two rigid supports. The tension in the string is T and mass per unit length is μ. A knife edge is placed at the position K at a distance x $(x \ll l)$ from the midpoint C of AB. The two segments of the string now vibrate in their respective fundamental modes. The beat frequency listened by the observer is

[Question ID = 137]

1. $(1/l^2)\,(T/\mu)^{1/2}$

[Option ID = 545]

2. $(x/l^2)\,(T/\mu)^{1/2}$

[Option ID = 546]

3. $(T/\mu)^{3/2}$

[Option ID = 547]

4. $(1/x)(T/\mu)^{3/2}$

[Option ID = 548]

38) Two light waves of same wavelength 628 nm in air have same initial phase difference. One travels through a glass layer of thickness $'d'$, and the other one through the plastic layer of same thickness $'d'$. The refractive indices of the glass and plastic are 1.65 and 1.45, respectively. If the waves end up with the phase difference of 5.0 rad, the least value of the thickness should be

[Question ID = 138]

1. 628 nm

[Option ID = 549]

2. 2500 nm

[Option ID = 550]

3. 5000 nm

[Option ID = 551]

4. 6280 nm

[Option ID = 552]

39) Two points seen as white dots are 1 mm apart on a black paper. They are viewed by an eye of pupil having a diameter of 3.0 mm. The maximum distance at which these dots can be resolved by the eye is:

(Take wavelength of light = 500 nm)

[Question ID = 139]

1. 5 m

   [Option ID = 553]
2. 1 m

   [Option ID = 554]
3. 6 m

   [Option ID = 555]
4. 3 m

   [Option ID = 556]

40) A parallel beam of light of wavelength $(\lambda = 0.7\ \mathrm{nm})$ falls on a uniformly thick soap film making an angle of 30° with the normal to the surface of the film. If constructive second order interference pattern is observed with the refelected light, then the thickness of the soap film is

[Question ID = 140]

1. 0.426 nm

   [Option ID = 557]
2. 0.5 nm

   [Option ID = 558]
3. 4.26 nm

   [Option ID = 559]
4. 0.0426 nm

   [Option ID = 560]

41) The isothermal compressibility and expansivity of a substance are respectively given by ($\beta_T = aT^2/P^2$) and ($\alpha = bT/P$), where 'a' and 'b' are constants, T and P and temperature and pressure respectively. The equation of state for the system under consideration is

[Question ID = 141]

1. $V = V_0 \exp\left(\frac{\left(a+\frac{b}{2}\right)T^2}{P}\right)$

   [Option ID = 561]
2. $V = V_0 \exp\left(\frac{(a+b)T^2}{P}\right)$

   [Option ID = 562]
3. $V = V_0 \exp\left(\frac{(a+b)T}{P}\right)$

   [Option ID = 563]
4. $V = V_0 \exp\left(\frac{(a+b)T^2}{P^2}\right)$

   [Option ID = 564]

42) A thermally insulated container contains n moles of gas molecules having gas constant R molar mass M and ratio of specific heats $\gamma = C_p/C_v$ if the temperature inside the container suddenly increases by ΔT , the velocity of the gas molecules would be

[Question ID = 142]

1. $v = \{[2R\Delta T]/[M(\gamma+1)]\}^{1/2}$

   [Option ID = 565]
2. $v = \{[2R\Delta T]/[M(\gamma-1)]\}^{1/2}$

   [Option ID = 566]
3. $v = \{[2R\Delta T]/[M(\gamma+1)^{1/2}]\}^{1/2}$

   [Option ID = 567]
4. unchanged

   [Option ID = 568]

43) A Carnot engine operates at an efficiency of 60%. If the sink temperature is 100 °C, the source temperature is closest

to[Question ID = 143]
1. 165 °C [Option ID = 569]
2. 250 °C [Option ID = 570]
3. 660 °C [Option ID = 571]
4. 930 °C [Option ID = 572]

44) A collection of 3 dimensional isotropic simple harmonic oscillators is in equilibrium with a heat bath of temperature. The number of oscillators in the first excited state to that in ground state is

[Question ID = 144]
1. $e^{\frac{0.5\hbar\omega}{kT}}$

   [Option ID = 573]
2. $e^{\frac{-\hbar\omega}{kT}}$

   [Option ID = 574]
3. $3e^{\frac{-\hbar\omega}{kT}}$

   [Option ID = 575]
4. $\frac{1}{3}e^{\frac{-\hbar\omega}{kT}}$

   [Option ID = 576]

45) Suppose that the potential energy of an hypothetical atom consisting of a proton and electron is given by $U = -\frac{ke^2}{3r^3}$. Then if Bohr's postulates are applied to this atom, then the radius of the n^{th} orbit will be proportional to

[Question ID = 145]
1. n^2

   [Option ID = 577]
2. $\frac{1}{n^2}$

   [Option ID = 578]
3. n^3

   [Option ID = 579]
4. $\frac{1}{n^3}$

   [Option ID = 580]

46) A moving hydrogen atom makes a head on collision with a stationary hydrogen atom. Before collision both the atoms are in ground state and after collision they stick and move together. What is the minimum value of the kinetic energy of the moving hydrogen atom, such that one of the atoms reaches one of the excited states?[Question ID = 146]
1. 10.2 eV [Option ID = 581]
2. 12.08 eV [Option ID = 582]
3. 20.4 eV [Option ID = 583]
4. 5.1 eV [Option ID = 584]

47) The mean momentum p of a nucleon in a nucleus of mass number A and atomic number Z depends on A, Z as

[Question ID = 147]
1. $p \propto A^{1/3}$

   [Option ID = 585]
2. $p \propto A^{-1/3}$

   [Option ID = 586]
3. $p \propto Z^{1/3}$

   [Option ID = 587]
4. $p \propto AZ$

   [Option ID = 588]

48)
A system of 8 non-interacting electrons is confined by a three dimensional potential $V(r) = \frac{1}{2}m\omega^2 r^2$. The ground state energy of the system in units of $\hbar\omega$ is

[Question ID = 148]
1. 18

   [Option ID = 589]
2. 16

[Option ID = 590]
3. 8

[Option ID = 591]
4. 24

[Option ID = 592]

49) Which of the following is an acceptable spin orbital for a two electron system? ("α" and "β" represent spin-up and spin-down states respectively and labels "1" and "2" represent the two electrons)

[Question ID = 149]
1. $(1/\sqrt{2})[\alpha(1)\beta(2) + \alpha(2)\beta(1)]$

[Option ID = 593]
2. $(1/\sqrt{2})[\alpha(1)\beta(1) + \beta(2)\alpha(1)]$

[Option ID = 594]
3. $(1/\sqrt{2})[\alpha(1) + \beta(2)]$

[Option ID = 595]
4. $(1/\sqrt{2})[\alpha(1)\,\beta(2)]$

[Option ID = 596]

50) A photon of initial wavelength 0.4 Å suffers two successive collisions with two electrons. The deflection in the first collision is 90° and the deflection in the second collision is 60°. The final wavelength of the photon is:

[Question ID = 150]
1. 0.024 Å

[Option ID = 597]
2. 0.012 Å

[Option ID = 598]
3. 0.4 Å

[Option ID = 599]
4. 0.436 Å

[Option ID = 600]