TEST SERIES CSIR-UGC-NET/JRF Dec. 2016

BOOKLET SERIES A

Paper Code 05

Test Type: TEST SERIES

PHYSICAL SCIENCES

Duration: 02:00 Hours

Date: 21-11-2016

Maximum Marks: 120

Read the following instructions carefully:

1. Attempt all the questions.
2. This booklet contain 60 Objective Type Questions, each Question carry **2 marks** each.
3. For rough work, blank sheet is attached at the end of test booklet.
4. There will be negative marking @25% for each wrong answer.
5. Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.
6. The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

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ATOMIC & MOLECULAR PHYSICS + EMT + QUANTUM MECHANICS

1. Positronium is an atom formed by an electron and positron. The mass of a positron is the same as that of an electron and its charge is equal in magnitude but opposite in sign to that of an electron. The shortest wavelength present in the Paschen series in the spectra of Positronium atom will be

(a) 364 *nm* (b) 820 *nm* (c) 1640 *nm* (d) 1092 *nm*

2. The total number of Zeeman components observed in an electronic transition ${}^3P_1 \to {}^3S_1$ of an atom under presence of weak magnetic field is

(a) 4 (b) 6 (c) 7 (d) 10

3. The K_α line of an unlnown material has an energy of 66 keV. The atomic number of the unknown material will be

(a) 47 (b) 63 (c) 77 (d) 82

4. The hyperfine structure of $Bi\left({}^2D_{5/2}\right)$ with nuclear spin $I = \frac{9}{2}$ has

(a) 4 levels (b) 6 levels (c) 8 levels (d) 10 levels

5. The far infrared rotational absorption spectrum of diatomic molecule shows equidistant lines with spacing 10 cm^{-1}. The position of the second anti-stokes line relative to exciting line in the rotational Raman spectrum of the molecule is

(a) 20 cm^{-1} (b) 40 cm^{-1} (c) 50 cm^{-1} (d) 60 cm^{-1}

6. Consider a heteronuclear linear rigid diatomic molecule and the mean distance between the two atoms is 0.1 nm. At 400 K, the rotational energy level of the molecule have the maximum population, will be
(Given the rotational constant of the molecule is 10 cm^{-1})

(a) J = 2 (b) J = 3 (c) J = 4 (d) J = 5

7. A monchromatic source of wavelength of a 0.8 μm is used to pick a particular laser cavity mode in an optical resonator cavity of length 10 cm. The output mode number will be

(a) 250 (b) 2500 (c) 25000 (d) 250000

8. The ground state spectroscopic term for nd^7 electronic state is :

(a) ${}^4F_{3/2}$ (b) ${}^4F_{9/2}$ (c) ${}^2D_{5/2}$ (d) ${}^2D_{3/2}$

9. The degeneracy of $1s^2, 2s^2, 2p, 3p$ atom is

(a) 36 (b) 15 (c) 9 (d) 12

10. The equilibrium vibrational frequency of an IR active molecule is observed at 3000 cm^{-1}. If the ratio of the frequencies of the first overtone and the fundamnetal band is found out to be 1.9, then the anharmonicity constant (x_e) of the oscillator will be

(a) 0.02 (b) 0.045 (c) 0.06 (d) 0.08

11. The first ionisation potential of potassium (K) is 4.34 V. The effective nuclear charge experienced by the valence electron of K atom is

(a) 2.25e (b) 1.26e (c) 1.84e (d) 2.78e

12. The intensity ratio of spectral lines emitted from ${}^2D_{5/2} \to {}^2P_{3/2}$ and ${}^2D_{3/2} \to {}^2P_{3/2}$ transitions, respectively is

(a) 2 : 3 (b) 2 : 1 (c) 3 : 1 (d) 3 : 2

13. The total magnetic moment (μ_J) in the ground state of Cr^{3+} ion is (atomic number of Cr is 24)

(a) $\sqrt{\frac{5}{3}}\,\mu_B$ (b) $\sqrt{\frac{3}{5}}\,\mu_B$ (c) $\sqrt{15}\,\mu_B$ (d) $\frac{1}{2}\sqrt{15}\,\mu_B$

14. The D-line of sodium (Na) is emitted from $3p \to 3s$ transition and has a wavelength of ~ 6000 Å. The life time of 3p level is 2 ns. The natural broadening in the wavelength of D-line is

(a) 0.01 Å (b) 0.1 Å (c) 0.001 Å (d) 1 Å

15. Which one of the following is not true for CO_2 molecule

(a) it is microwave in-active (b) it is rotational Raman active

(c) it is vibrational Raman active (d) it is IR active

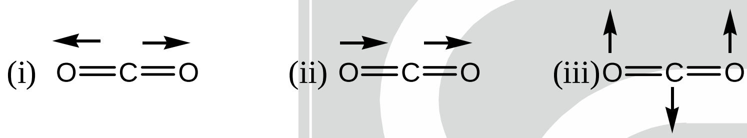
16. The longitudinal mode separation in the He-Ne LASER corresponding to a cavity length of 1 cm is

(a) 15 MHz (b) 15 KHz (c) 15 GHz (d) 15 THz

17. A spectral line corresponding to the transition $J=1 \to J=0$ state splits into three lines in a magnetic field of 1 T. If zero field spectral line has wavelength of 6000 Å. The wavelength shift in the presence of weak magnetic field is (in Å)

(a) 28×10^{-2} (b) 18×10^{-2} (c) 36×10^{-2} (d) 24×10^{-2}

18. Of the vibrational modes given below, the IR active mode(s) is(are)



(a) (ii) only (b) (iii) only (c) (i) and (ii) (d) (ii) and (iii)

19. The molecule which shows some common lines in the IR and Raman spectra is

(a) CO_2 (b) CS_2 (c) N_2O (d) H_2

20. In the presence of an weak magnetic field, the transition $^1D_2 \to {}^1P_1$ splits into

(a) 3 lines (b) 9 lines (c) 7 lines (d) 6 lines

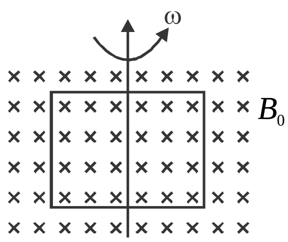
21. The skin depth (δ) in aluminium (Al) with conductivity $\sigma = (3.6\times10^7)\,\Omega^{-1}m^{-1}$ at 1.6 MHz is

(a) 66.4μm (b) 54.5 μm (c) 74.4 μm (d) 46.9 μm

22. An electromagnetic wave incident on dielectric-air $(\varepsilon_r = 4)$ interface at an angle θ. The minimum angle of incidence (θ) at which incident wave is totally reflected into dielectric is

(a) 0º (b) 30º (c) 45º (d) 60º

23. A source loop of side *a* and resistance R is rotating with constant angular velocity ω in a constant magnetic field (B_0) as shown in the figure. The average power (P) dissipated in the loop is proportional to



(a) ω (b) ω^2 (c) ω^4 (d) ω^6

24. Unpolarized light of intensity I_0 gets polarized as it emerges from a polarizer. It then passes through an analyzer. The intensity of light emerging from the analyser is $\frac{3}{8}I_0$. The angle between the polarizing directions of the polarizer and analyser is:
(a) 30º (b) 60º (c) 90º (d) 45º

25. Let $\vec{E}(\vec{r},t)$ and $\vec{B}(\vec{r},t)$ denote the electric and magnetic fields obeying Maxwell's equations then under a Lorentz transformation from one inertial frame to another inertial frame. Choose which is not Lorentz invariant:

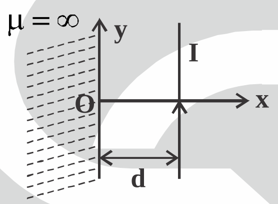
(a) $\left(\vec{E}.\vec{B}\right)^2$ (b) $\varepsilon_0 E^2 - \frac{B^2}{\mu_0}$ (c) $\left|\vec{E}\right|^2 - \left|\vec{B}\right|^2$ (d) $\left|\vec{E}\right|^2\left|\vec{B}\right|^2$

26. A plane electromagnetic wave is propageting in non-magnetic, isotropic, dielectric medium is given by

$$\vec{E} = (A\hat{x} + \hat{z})\cos\left(10^9 t - 4x + 4\sqrt{3}\, z\right)$$

Refractive index (n) of the medium is:
(a) 4.2 (b) 2.0 (c) 2.4 (d) 1.5

27. A long thin wire carrying a current 'I' lies parallel to and at a distance 'd' from a semi-infinite slab of iron of infinite permeability $\mu = \infty$ as shown in the figure below. The force per unit length on the wire is:



(a) $\frac{\mu_0 I^2}{4\pi d}\hat{x}$ (b) $\frac{\mu_0 I^2}{2\pi d}\hat{x}$ (c) $\frac{\mu_0 I^2}{4\pi d}\hat{z}$ (d) $\frac{\mu_0 I^2}{2\pi d}(-\hat{x})$

28. Consider an electromagnetic wave in free space with no electric charges or currents are present. Given that $\vec{B} = A\sin(\alpha y)\cos\omega t\,\hat{z}$, where α and ω are constants. This wave represents:
(a) A circularly poloarised wave propagating along y-direction
(b) An elliptically polarised wave propagating along y-direction
(c) A plane wave polarised wave propagating along y-direction
(d) A standing wave

29. A circular conducting loop of radius 2 cm and resistance 1Ω lies in *x*-*y* plane. A constant magnetic field (B) of 1T applied along *z*-direction. If radius of loop is reduced from 2 cm to 1 cm, the total charge (Q) passes through given point in the loop is (in coulombs)

(a) 0 (b) 9.4×10^{-4} (c) 9.4×10^{-2} (d) 12.6×10^{-4}

30. Suppose the electric field in some region is found to be $\vec{E} = kr^2\hat{r}$ (where k is some constant). The total chage contained in the sphere of radius *R* centred at origin is:

(a) $5\in_0 kr^2$ (b) $4\in_0 kr^2$ (c) $4\pi\in_0 kR^5$ (d) $\frac{16}{5}\pi\in_0 kR^5$

31. A long cylinder of radius R carries a volume charge density $\rho = kr,$ where r is distsance from axis of the cylinder. If electric field at distance $r = \frac{R}{2}$ is E_0, the value of electric field at distance $r = \frac{3R}{2}$ is :

(a) $\frac{16E_0}{9}$ (b) $\frac{E_0}{9}$ (c) $\frac{E_0}{36}$ (d) $\frac{8}{3}E_0$

32. A long cylinder of radius R carries a current flowing along its length. The density of current is $J = J_0\left(1-\frac{r}{R}\right)$, r is distance from axis of cylinder. The magnetic field is maximum at distance d from the axis then :

(a) $d = \frac{R}{2}$ (b) $d = \frac{2R}{3}$ (c) $d = \frac{R}{4}$ (d) $d = \frac{3R}{4}$

33. Magnetic vector potential due to a current distribution is $\vec{A} = \frac{k\sin\theta}{r^2}\hat{\phi}$. The magnetic field at point (r,θ,ϕ) is :

(a) $\frac{2k}{r^3}\hat{\phi}$ (b) $\frac{2k}{r^3}\hat{\theta}$ (c) $\frac{k\sin\theta}{r^3}\hat{\phi}$ (d) $\frac{k\sin\theta}{r^3}\hat{\theta}$

34. When two plane electromagnetic waves whose electric fields are $\vec{E}_1 = E_0\hat{i}\sin\left(kz-\omega t+\frac{\pi}{3}\right)$ and $\vec{E}_2 = E_0\hat{j}\sin\left(kz-\omega t-\frac{\pi}{6}\right)$ are superposed the resulting wave is

(a) A standing wave
(b) Left elliptically polarized progressive wave
(c) Left circularly polarized progressive wave
(d) Plane polarized progressive wave

35. Assume that a lamp radiates power P uniformly in all the directions. The electric field strength at a distance 'r' from the lamp varies as :

(a) independent of 'r' (b) $\frac{1}{r}$ (c) $\frac{1}{r^2}$ (d) $\frac{1}{r^3}$

36. An electromagnetic wave is normally incident on an air-dielectric interface. The dielectric media is isotropic and non magnetic. The magnetic field of electromagentic wave in dielectric medium is given by

$$\vec{B} = 4\times10^{-8}\left(A\hat{i}+3\hat{j}\right)e^{i\left(3x+4y-5\times10^{8}t\right)} \text{ wb/m}^2$$

Where A is same constant. The fraction of energy reflected from the dielectric interface is:

(a) 1 (b) 0.25 (c) 0.33 (d) 0.5

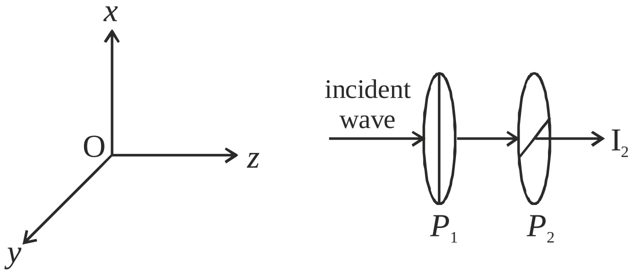
37. A large sheet having surface charge density σ is lying in x-y plane. It is moved with speed v in y-direction. Poynting vector above the sheet is

(a) $\frac{\sigma^2 v}{4\varepsilon_0}\hat{x}$ (b) $\frac{\sigma^2 v}{4\varepsilon_0}\hat{y}$ (c) $\frac{\sigma^2 v}{4\varepsilon_0}\hat{z}$ (d) $\frac{\sigma^2 v}{4\sqrt{2}\varepsilon_0}\left(\hat{x}+\hat{y}\right)$

38. In an air filled square wave guide with $a = 2$ cm has electric field $E_x = -10\sin(100\pi y)\sin(\omega t - 150z)$ v/m. The mode of propagation of wave is:

(a) TE_{01} (b) TE_{10} (c) TM_{11} (d) TE_{02}

39. A plane polarised wave, $\vec{E} = E_0(\hat{i} + \hat{j})e^{i(kz-\omega t)}$ is incident normally on a polariser P_1 which has pass axis parallel to x-axis.



Another polariser P_2 has pass axis which is inclined at 30º with respect to y-axis. The intensity (I_2) of light after passing through polariser P_2 is

(a) $\frac{1}{8}c\varepsilon_0 E_0^2$ (b) $\frac{3}{8}c\varepsilon_0 E_0^2$ (c) $\frac{1}{4}c\varepsilon_0 E_0^2$ (d) $\frac{3}{4}c\varepsilon_0 E_0^2$

40. Two semi-infinite conducting planes meet at an angle of 60º, the number of image charges formed are

(a) 4 (b) 3 (c) 5 (d) 6

41. A particle of mass 'm' is moving under the following potential:

$$V(x,y,z) = \begin{cases} 0 & \text{for } 0 < x < L, 0 < y < 2L, 0 < z < 3L \\ \infty & \text{elsewhere} \end{cases}$$

The energy eigenvalue of the second excited state of the particle will be

(a) $\frac{49h^2}{288mL^2}$ (b) $\frac{9h^2}{32mL^2}$ (c) $\frac{61h^2}{288mL^2}$ (d) $\frac{19h^2}{72mL^2}$

42. A particle of mass m and energy E is incident on the following repulsive Dirac delta potential:

$V(x) = V_0\,\delta(x)$ [where V_0 is positive real constant]

The corresponding transmission coefficient for the particle will be

(a) $\frac{1}{1+\frac{mV_0^2}{2E\hbar^2}}$ (b) $\frac{1}{1+\frac{mV_0^2}{E\hbar^2}}$ (c) $\frac{1}{1-\frac{mV_0^2}{E\hbar^2}}$ (d) $\frac{1}{1-\frac{mV_0^2}{2E\hbar^2}}$

43. If the expectation value of the momentum is p_0 for the wavefunction $\psi(x)$, then the expectation value of momentum for the wavefunction $e^{-ikx}\psi(x)$ will be

(a) p_0 (b) $p_0 + \hbar k$ (c) $p_0 - \hbar k$ (d) $\hbar k$

44. Consider an atom with spin quantum number $s = \frac{1}{2}$. At a certain time, the z-component of the spin angular momentum is measured and is found to be $\frac{\hbar}{2}$. Immediately after this, the component of the spin a n g u l a r

momentun in the direction $\frac{\sqrt{3}\hat{i}+\hat{k}}{2}$ is measured. The probability that this component will be found to be $\frac{\hbar}{2}$, is

(a) 0.25 (b) 0.75 (c) 0.5 (d) 0.33

45. A simple harmonic oscillator has a potential energy $V_0(x)=\frac{1}{2}kx^2$. If an additional potential energy term is $V_1(x)=ax$ is added to it, then which of the following statements is NOT CORRECT about the new system?

(a) The motion is still simple harmonic with the same frequency.

(b) The motion is still simple harmonic around a shifted equillibrium.

(c) The difference between the energies of first two levels is $\hbar\omega$.

(d) The ground state energy of the particle will be $\frac{1}{2}\hbar\omega$.

46. A rigid rotator is in a quantum state described by the following wavefunction:

$$\psi(\theta,\varphi)=A\sin\theta\sin\varphi$$

where θ and φ are usual polar angles in spherical polar coordinates. The expectation of L_z^2 in the given state (in the unit of $\hbar^2$)

(a) 0 (b) 1 (c) -1 (d) 1/2

47. A particle is in a state which is a superposition of the ground state φ_0 and first excited state φ_1 of a one-dimensional infinite potential well of width L. The state is given by $\psi=\varphi_0+\varphi_1$. The energy uncettainty in the given state of the particle, will be

(a) $\frac{3\pi^2\hbar^2}{2mL^2}$ (b) $\frac{3\pi^2\hbar^2}{4mL^2}$ (c) $\frac{3\pi^2\hbar^2}{mL^2}$ (d) $\frac{\pi^2\hbar^2}{2mL^2}$

48. A particle of mass m moves in a 3-D potential $V(r)=c\left[\frac{r}{r_0}-\ell n\left(1+\frac{r}{r_0}\right)\right]$, where c and r_0 are positive constants of appropriate dimensions. The ground state energy of the particle in $\frac{r}{r_0}<<1$ limit, is

(a) $\frac{1}{2}\sqrt{\frac{c\hbar^2}{mr_0^2}}$ (b) $\frac{3}{2}\sqrt{\frac{c\hbar^2}{mr_0^2}}$ (c) $\frac{1}{2}\sqrt{\frac{c\hbar^2}{2mr_0^2}}$ (d) $\frac{3}{4}\sqrt{\frac{c\hbar^2}{2mr_0^2}}$

49. The unperturbed Hamiltonian of a system is given by $H_0=\begin{pmatrix}1&0&0\\0&2&0\\0&0&3\end{pmatrix}$. If a small perturbation

$H_p = \varepsilon \begin{pmatrix} 0 & 2 & 0 \\ 2 & 1 & 3 \\ 0 & 3 & 1 \end{pmatrix}$ is applied to the system then the energy $E = 2$ corrected to the second order in ε is

(a) $2+2\varepsilon-5\varepsilon^2$ (b) $2+13\varepsilon^2$ (c) $2+\varepsilon+13\varepsilon^2$ (d) $2+\varepsilon-5\varepsilon^2$

50. Consider a quantum particle of mass m is moving under the following potential:

$$V(x,y) = \frac{1}{2}m\omega^2\left(x^2+y^2\right)$$

It is known that the particle is in an energy eigenstate with energy eigenvalue $6\hbar\omega$. Which one of the following cannot be the wave function of the particle? (Given: $H_n(x)$ is Hermite polynomial of order n)

(a) $H_4\left(\sqrt{\frac{m\omega}{\hbar}}x\right)H_1\left(\sqrt{\frac{m\omega}{\hbar}}y\right)\exp\left[-\frac{m\omega}{\hbar}\left(x^2+y^2\right)\right]$ (b) $H_2\left(\sqrt{\frac{m\omega}{\hbar}}x\right)H_3\left(\sqrt{\frac{m\omega}{\hbar}}y\right)\exp\left[-\frac{m\omega}{\hbar}\left(x^2+y^2\right)\right]$

(c) $H_5\left(\sqrt{\frac{m\omega}{\hbar}}x\right)\exp\left[-\frac{m\omega}{\hbar}\left(x^2+y^2\right)\right]$ (d) $H_3\left(\sqrt{\frac{m\omega}{\hbar}}x\right)H_3\left(\sqrt{\frac{m\omega}{\hbar}}y\right)\exp\left[-\frac{m\omega}{\hbar}\left(x^2+y^2\right)\right]$

51. The dynamics of a particle of mass 'm' moving under a one-dimensional potential $V(x)$ is governed by the Hamiltonian $H_0 = \frac{p^2}{2m}+V(x)$, where $p=-i\hbar\frac{d}{dx}$ is the momentum operator and $E_n^{(0)}\ (n=1,2,3.....)$ be the eigenvalues of H_0. Now, consider the following Hamiltonian:

$$H = H_0 + \frac{\lambda p}{m}\left(\text{where } \lambda \text{ is real constant parameter}\right)$$

The eigenvalue of the hamiltonian H is

(a) $E_n^{(0)}+\frac{\lambda}{m}$ (b) $E_n^{(0)}+\frac{\lambda^2}{2m}$ (c) $E_n^{(0)}-\frac{\lambda^2}{2m}$ (d) $E_n^{(0)}-\frac{\lambda}{m}$

52. Consider a particle of mass 'm' is moving under some kind of 1-D potential and the wavefunctions of the particle in the ground state (E_0) and first excited state (E_1) are as follows:

$$\psi_0(x) = N_0e^{-x} \text{ and } \psi_1(x) = N_1(2-x)e^{-x/2}$$

If a variational trial wave function $N_2(3-x)e^{-x}$ gives an average energy $\langle E\rangle$, then which of the following relation is TRUE?

(a) $0 \le \langle E\rangle \le E_0$ (b) $E_0 \le \langle E\rangle \le E_1$ (c) $\langle E\rangle \ge E_1$ (d) $\langle E\rangle = 0$

53. Two identical spin half particles with two spins parallel are in a 3-D box of sides a,b,c $(a>b>c)$. The potential representing the interaction between the particles is given as

$$V(\vec{r}_1,\vec{r}_2) = A\delta(\vec{r}_1-\vec{r}_2)$$

The ground state energy of the system corrected upto first order perturbation theory, is

(a) $\frac{\pi^2\hbar^2}{2m}\left[\frac{5}{2a^2}+\frac{1}{b^2}+\frac{1}{c^2}\right]$ (b) $\frac{\pi^2\hbar^2}{m}\left[\frac{5}{2a^2}+\frac{1}{b^2}+\frac{1}{c^2}\right]$

(c) $\frac{\pi^2\hbar^2}{2m}\left[\frac{5}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}\right]$ (d) $\frac{\pi^2\hbar^2}{2m}\left[\frac{5}{a^2}+\frac{1}{b^2}+\frac{2}{c^2}\right]$

54. Consider a particle of mass 'm' of energy 'E' is moving under the following 1-D potential:

$$V(x)=\begin{cases}\infty & x\le 0\\ -\frac{9\pi^2\hbar^2}{2ma^2} & 0<x<a\\ 0 & x\ge 0\end{cases}$$

The number of possible bound states of the particles, is

(a) 2 (b) 3 (c) 4 (d) 5

55. The value of $\left[\hat{x}^2, \sin\hat{p}_x\right]$, where $\hat{x}$ and $\hat{p}_x$ are x-component of the position and linear momentum operator respectively, is

(a) $2i\hbar\,\hat{x}\cos\hat{p}_x$ (b) $2i\hbar\,\hat{x}\cos\hat{p}_x+\hbar^2\cos\hat{p}_x$

(c) $-2i\hbar\,\hat{x}\sin\hat{p}_x+\hbar^2\cos\hat{p}_x$ (d) $2i\hbar\,\hat{x}\cos\hat{p}_x-\hbar^2\sin\hat{p}_x$

56. Let, k be the wave number of the incident plane wave in a scattering experiment. If the scattering is a mixture of s-wave and p-wave with phase shifts $\frac{\pi}{6}$ and $\frac{\pi}{3}$ respectively, then the total scattering cross-section will be

(a) $\frac{2\pi}{k^2}$ (b) $\frac{4\pi}{k^2}$ (c) $\frac{6\pi}{k^2}$ (d) $\frac{10\pi}{k^2}$

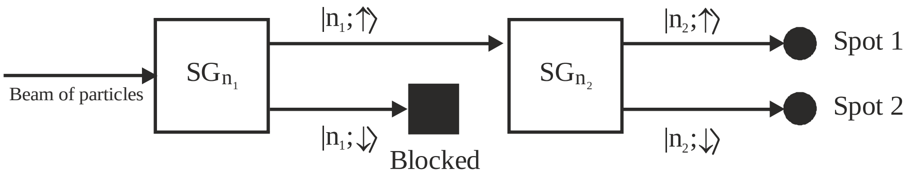
57. A quantum system with three orthonormal states $|1\rangle$, $|2\rangle$ and $|3\rangle$ is described by following hamiltonian :

$$\hat{H}=|1\rangle\langle 1|-i|1\rangle\langle 2|+2|2\rangle\langle 1|-2|2\rangle\langle 2|+2i|1\rangle\langle 3|+\sqrt{3}|3\rangle\langle 1|+|3\rangle\langle 3|$$

The sum of energy eigenvalues is

(a) 3 (b) 1 (c) 0 (d) 2

58. Consider the following sequential Stern Gerlach experiment (shown in figure below) having inhomogeneous magnetic fields along $\hat{n}_1$ and $\hat{n}_2$ respectively.



Here, $\hat{n}_1$ represents an unit vector making an angle of 60° with z-axis in the x-z plane and $\hat{n}_2$ represents an unit vector making an angle 60° with z-axis in y-z plane. After the first Stern Gerlach apparatus, one beam of particles is blocked (shown in figure) and another beam of particles is allowed to pass through another Stern Gerlach apparatus. After passing through second Stern Gerlach apparatus, two spots are observed on the screen (shown in figure). The ratio of the intensities of spot 1 and spot 2 will be

(a) 1 : 1 (b) 3 : 1 (c) 5 : 3 (d) 1 : 4

59. A spin-½ particle in a uniform external magnetic field has energy eigenstates $|1\rangle$ and $|2\rangle$ respectively. The system is prepared in the ket-state $\left(|1\rangle+|2\rangle\right)/\sqrt{2}$ at time $t=0$. It evolves with time and repeats itself after

time T. The minimum energy difference between the two energy levels is

(a) $\frac{h}{6T}$ (b) $\frac{h}{4T}$ (c) $\frac{h}{2T}$ (d) $\frac{h}{T}$

60. The average kinetic energy of the electron in the first excited state of Li^{++}, will be approximately

(a) 30.6 eV (b) 61.2 eV (c) 13.6 eV (d) 122.4 eV

Space for rough work

PHYSICAL SCIENCES
TEST SERIES-I

Date : 21-11-2016

ATOMIC & MOLECULAR PHYSICS + EMT + QUANTUM MECHANICS

ANSWER KEY

1. (c)	2. (b)	3. (d)	4. (b)	5. (c)	6. (b)	7. (d)
8. (b)	9. (a)	10. (b)	11. (a)	12. (d)	13. (b)	14. (c)
15. (b)	16. (c)	17. (b)	18. (d)	19. (c)	20. (a)	21. (a)
22. (b)	23. (b)	24. (a)	25. (d)	26. (c)	27. (a)	28. (d)
29. (b)	30. (c)	31. (d)	32. (d)	33. (d)	34. (c)	35. (b)
36. (b)	37. (b)	38. (d)	39. (a)	40. (c)	41. (d)	42. (a)
43. (c)	44. (b)	45. (d)	46. (b)	47. (b)	48. (b)	49. (d)
50. (d)	51. (c)	52. (c)	53. (b)	54. (b)	55. (d)	56. (d)
57. (c)	58. (c)	59. (d)	60. (a)			